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THE RAILROAD congestion, to which we have frequently referred in our market reports, continues to be quite a serious factor in business. The delays caused by the blockade in traffic render deliveries so uncertain that some large concerns are declining to guarantee any special delivery, where material has to be transported from the West. In the case of large transactions also, the interest on material in transit may amount to an item of considerable importance. We are not now speaking of the trouble caused by delays in the delivery of raw material to furnaces and mills, but rather of those in the transportation of goods to seaboard and Eastern points. The railroads claim to be doing their best to improve matters, but at the present time it is evident that they are not prepared to meet the extraordinary rush of traffic which has come to them.

⚒

IN CONNECTION with the letters from Messrs. Alfred James and H. C. Hoover, which we publish in this issue, it will be of interest to add, in relation to the milling methods in the Kalgoorlie District, that an arrangement was made, a couple of weeks ago, by which the Golden Horseshoe Company has contracted with the owners of the Diehl process, whereby the company, under royalties, will substitute the use of bromo-cyanide for the ordinary cyanide process. This is strong testimony in favor of the use of the bromo-cyanide method.

⚒

THE PRODUCTION of bessemer steel in the United States in 1902 was 9,306,471 tons; by far the greatest quantity ever made in any country in one year. Somewhat over one-half the pig iron made in this country went to the converter. The increase, however, over 1901 was only 6.8 per cent, or very much less than the increase in pig iron. This was partly due to a local and temporary cause, the dismantling of the plant of the Lackawanna Steel Company at Scranton; and this cause will be removed by the starting of the company's new works at Buffalo. In part, however, the cause of the comparatively slow increase in bessemer steel production is found in the rapid gain in open-hearth steel manufacture.

The bessemer or converter steel made in this country continues to be entirely acid steel. The basic converter has never taken hold here, and while we are making more basic steel each year, it is made entirely by the open-hearth process.

⚒

WHILE BESSEMER steel continues to be the material used almost exclusively for rails in this country, the proportion of the total output made into rails does not increase. In 1902 the rail mills used 32.4 per cent of the steel made, while in 1901 the proportion was 34.2 per cent. The quantity of rails made last year, however, was not up to the demand, and there will be a considerable increase during the current year, when the new mills of the Lackawanna Steel Company at Buffalo, and of the Tennessee Coal, Iron and Railroad Company at Ensley will be in operation. The Ensley mill, however, does not use bessemer, but basic open-hearth steel, and its output will increase the proportion of rails made from open-hearth steel, which has heretofore been very low. The change indicated above has been very great during the past ten years. Last year less than one-third of the bessemer steel made was used for making rails, the remainder being made into bars, plates, structural shapes and other forms; while ten years ago the proportions were reversed, rails absorbing about two-thirds. The change shows at once how the use of metal in construction has increased, and how largely steel has taken the place of wrought or puddled iron. It has taken the place of cast iron also, especially in locomotive and other machine construction. This process of substitution is still going on, and each year an increasing proportion of the pig iron output is converted into steel. The manufacture of open-hearth steel, however, is growing more rapidly than that of bessemer or converter metal.

⚒

WE FIND IT necessary from time to time to call attention to certain fundamental rules which editors and publishers consider necessary. The first of these is that we cannot use nor answer anonymous contributions. When correspondents desire it, their identity will remain known to the editor alone; but to receive notice of any kind they must send their names and addresses.

Second.—While we are always ready to give information on practical points and to answer questions of a proper kind which may be asked us by subscribers, we cannot recommend or pass judgment on processes of ore treatment, nor can we give opinions on the possible or probable value of ore deposits or mining property. In other words, we cannot undertake to answer questions which require the examination and advice of an expert for their proper solution. To do so would require time, which we cannot spare, and would be unjust to the many mining engineers and metallurgists who are our friends and constituents.

A third rule is that we cannot give individual advice as to mining investments. We give all the news which can be obtained as to districts and different mines, and we occasionally warn our readers against misrepresentations, but beyond this we cannot go.

We trust that our readers will bear these rules in mind, and thus save themselves from disappointment and us from the regret which always accompanies the necessity of failing to comply with a correspondent's request.

⚒

"SUTOR NE SUPRA CREPIDAM."

The arrest of Whitaker Wright on his arrival at this port marks another stage in the collapse of a spectacular career. The exposure of his business practices besmirched many honorable names and bankrupted at least a score of London brokers, so that, apart from the losses made by the general public who were shareholders in the London and Globe Finance Corporation and in the British America Corporation, his operations ruined a large group of men of standing in the financial arena. To the daily press the incident of his arrest serves as an opportunity for outlining a sky-rocket career, for dwelling upon the magnificent profuseness of his expenditures during the heyday of his prosperity and for pointing a moral concerning get-rich-quick mining schemes of all kinds.

But the point of the wretched story is not there. To our mind the salient feature of the whole episode is the demonstration once more of the fact that a clever adventurer can play the whole game of reckless promotion and irresponsible finance if only he first secures the association of a few good names; it suggests also that honorable men who lend their reputation to undertakings concerning which they are childishly ignorant deserve to get a much larger share of blame than is meted out to them when the day of reckoning arrives.

The distribution of directorships among men of social distinction, but quite innocent of business or technical experience, invites just such a sequence of events as that which has marked the downfall of the London & Globe, the British America and the Le Roi companies. To place such a man as Lord Dufferin on the board of a mining company is ridiculous when it is not pathetic; it would be not one whit more foolish to put a bishop in charge of an Atlantic liner or a barrister at the head of an assay office. When the boards of directors of mining companies in London are made up largely of military and naval men of distinction, of peers and pro-consuls, of names—and nothing more—how can the interests of shareholders be protected against clever adventurers who use them as unconscious lures to assist in the disposal of shares at a premium? Men of noble birth and distinction in their country's service accept a directorship for various reasons; occasionally, for the small emolument which goes with it, or for the reason that it gives them inside information concerning the affairs of the company in which they are shareholders, but most frequently they join a board because their reputation as men above reproach causes them to be considered suitable as directors by shareholders who fondly imagine that their interests become safeguarded by such a selection. A considerable proportion of the shareholders of London companies are clergymen, retired army and navy officers, squires, doctors, all sorts of good people who want to help out a small income by obtaining the big rate of interest promised by mining undertakings. To these the names of well-known peers and military men are an assurance that the enterprise is clean and that it will be properly conducted. But this is a fallacy of the pathetic kind. A trickster like Whitaker Wright can delude men with no business training and no desire to go into details, with a facility which has been demonstrated by "Baron" Grant, Hooley and a dozen other successful promoters of the same class. "Sutor ne supra crepidam." Let the soldier lead his squadrons, let the admiral fly his pennant, let the peer attend to his duties as a hereditary legislator, but in the name of common sense keep them out of the council rooms of mining companies, where their talents are wholly wasted and their inexperience only invites ultimate disaster. That was the story of General Grant, who closed a career of illustrious service only to become involved in the disreputable failure of Ferdinand Ward. This is the story of Whitaker Wright and his association with the Marquis of Dufferin and Ava, Lord Loch, Sir William Robinson, Lord Edward Pelham-Clinton, Colonel the Hon. Somerset J. Gough-Calthorp and other men of high degree.

⚒

PROGRESS ON THE RAND.

The labor situation dominates all other factors on the Rand. There are now about 50,000 natives at work, as compared to about twice that number before the war. It is to be noted, however, that the larger number before the war represented the recruiting of eight years, while those now at work are the outcome of the efforts of only two years.

It is likely that the error made in cutting down wages will, for a time, interfere with successful results. During the war an organization named the Witwatersrand Native Labor Association was formed to carry out systematic recruiting. Those who directed this organization saw fit to oppose economic laws by fixing the price of labor, before the natives were procured, and decreed that the average Kaffir should be paid one shilling per day, a reduction of nearly one-half, as compared to the old scale of wages. This proved disastrous, for it stopped the influx of natives and upset their notions of justice. As a matter of fact, the Kaffirs made money during the war, and since the declaration of peace they have been in demand on railways, public works and the general reconstructive operations of the new regime. This has introduced a competitive element into the problem such as was not felt before the war. It has been announced recently that the future rate of wages to natives is to be 50 shillings per month, instead of the 30 shillings first offered by the Labor Association. This rise in pay will have its effect in time, but first it will be necessary to regain the confidence of the Kaffirs and get them to regard the Association as something better than a scheme to take advantage of their weakness. Their suspicion and hesitation will be overcome when their fellows return home with the savings accumulated at the mines, and thus eventually the attraction of mining will induce them to come in with greater alacrity.

In the meantime, press dispatches indicate that an effort is being made to get laborers from India. This follows a spasmodic attempt to secure Italian miners. All these methods of solving the labor trouble in a hurry by external help are likely to fail, and will postpone the settlement of the problem on the only possible lines—the utilization of the natives indigenous to South Africa, by patient organization and fair treatment.

⚒

GOLD MINING AS AN INVESTMENT.

We note that our London contemporary, *The Economist,* which represents the best traditions of financial journalism, has finished the publication of a series of articles by its "Special Mining Commissioner," under which title we have easily recognized the trenchant style and fearless expression of opinions which characterize our friend, Mr. J. H. Curle. The concluding article of this series, an abstract of which will be found on another page, winds up with a few home truths and that undercurrent of depressing frankness which we have learned to associate with Mr. Curle's writings.

The burden of these recent contributions to the pages of *The Economist* has been that: Gold mines are, with rare exceptions, much overvalued; shareholders do not realize the risk and are satisfied with a rate of interest which is too small, considering that risk; they are careless regarding questions of ore reserves; they end inevitably by over-rating their mines and, in consequence, they speculate foolishly. As a corollary, it is suggested by Mr. Curle that a certain rate of dividend, a certain proportion of ore reserves and a healthy condition of development are essential to any mining enterprise which is to be regarded as an investment.

While we appreciate the service done to the public and, no less, to the industry, by advice of this kind, we consider that it tells only half the story, and is calculated to create a wrong impression concerning gold mining.

Legitimate gold mining is not necessarily an investment, nor indeed does even so conservative an industry as farming come always under this label. There are types in both industries which proceed along such well ordered lines, and with such consecutive regularity of production that their earning capacity can be safely predicted; but each exhibits variations of procedure which are both profitable and risky in a proportionate degree. In this country gold mining is not ranked with railroad bonds, save by the unthinking. It is true that there are a few properties which have become developed to such an extent that, like the mines on the Rand, they are, humanly speaking, certain to return a stated sum in capital *plus* a definite interest during the period of extraction, but they are so few that the fingers of a man's hand suffice to count those which he can quote impromptu. The moneyed man who goes into mining to make more money knows this. He does not expect to find a Homestake or an Alaska-Treadwell, and if you cross-examine him you will probably discover that he does not want that type of mine so much as he seeks for a Little Pittsburg, a Chrysolite, a Yankee Girl, a Granite Mountain, an Independence, a Tonopah—that is, the superlatively rich ore deposit which makes as much money in a month as the steady producer earns in five years. In other words, the speculative side of mining has an attractiveness which is at the bottom of the energy with which it is prosecuted, and when you bring it to the dead level of a steady investment you will find that the man of ordinary shrewdness will save time by going straight to his broker and buying bonds or consols.

The Rand—presenting an unusual type of gold min-

ing, minimizing risks and at the same time limiting possibilities—has run away with our cautious advisor. Ordinary gold minng can never come to a strictly investment basis; from the time of the Argonauts to that of Cape Nome it has been, and will continue to be, an adventurous pursuit, attractive to the bold and avoided by the timorous.

Strike out the mines which are not sound investments from the undertakings into which a sensible man should put his money, and you shrivel legitimate mining into a dry business, which would soon wither from want of life. Before the investment basis is reached the best mining undertaking must as surely pass through several stages of comparative speculativeness as a child must run the dangers of measles and mumps. The biggest fortunes are made during the earlier stages of development; more money is made by selling than by buying mines simply because the final or investment stage of a first-class mine brings less profit, while it never can quite eliminate the essential hazard.

Mining undertakings come to grief so often, not so much on account of failure to attain an investment basis, but because they are not put on a business basis. People play the fool and expect miracles to happen. The same procedure would ruin a grocery establishment. Because the occurrence of ore in nature is uncertain, and mining as a consequence must necessarily be speculative, there is no reason for piling human foolishness on the top of nature's niggardliness. Of well conducted mining enterprises it can be said that they meet with as large a percentage of success, if not larger, as any ordinary manufacturing undertaking. The smashes are more spectacular and the successes are more magnificent in the former case, but the average result does not, as a rule, favor the apparently safer form of industry. We are glad to be able to believe, with *The Economist,* that mining methods are becoming more sane; and we recognize that this consummation is quickened by the good sense contained in such contributions as those to which we have been referring.

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COPPER CONDITIONS.

In our issue of January 3d last, in reviewing the copper market for 1902, we stated that the large surplus which overhung the market at the opening of last year had practically disappeared; that the stocks at that time were not sensibly in excess of the normal quantity which must always be carried by producers, and that the market had escaped from the depressing influences which had prevailed, and was then ready to resume its normal condition. Events since then have fully justified our statement, as the present condition of the copper market shows. The advance in prices which began soon after the opening of the new year, and which has since continued without interruption, has been gathering impetus, as such movements will, and now seems to be beyond control. Under these circumstances it is quite probable that copper will go to a point beyond that which is fully justified by the conditions, and that quotations will reach a higher level than any one anticipated two months ago. An extreme rise is likely to be followed by some reaction, but it is not at all probable that we will see a return to the low figures of 1902 for some time to come.

It has been a matter of general remark that copper alone among the metals of construction did not seem to feel the effects of the great consumption of the past year. While iron and steel and other metals were showing advances, copper retained a nearly even level of prices, although it was a matter of common knowledge to those who were familiar with the trade, that the consumption in manufactures was greater than had ever been known before. In part, this was due to the heavy stocks which had accumulated in 1901, and in part also to certain influences which were well understood and which were employed to depress the market whenever a disposition towards improvement became apparent. The market, as we have heretofore said, has now broken completely away from these influences, and copper is securing the advance which was apparent in iron and steel more than a year ago. In other words, we have been having in a few weeks, the rise in prices which should have been spread over at least half a year. This makes the advance seem unduly rapid, but it is not, if everything is taken into account.

To state briefly the conditions at the present time: The consumption in this country is on the largest scale ever known. Business in Europe is improving, and electrical and other enterprises are being rushed, with a resulting demand for copper. Production has overtaken consumption, and the consequences are apparent. The movement has, of course, been emphasized, as such movements always are, by the fact that every one wishes to buy on a rising market, and the rush of purchasers produces a more rapid advance. While the actual figures for the present year cannot be obtained, owing to the unfortunate disruption of the Copper Producers' Association, there is no doubt that the output for the first quarter of the year has not shown any large increase over the corresponding period of 1902. Later in the year this condition may be changed somewhat. Exports in January and February were somewhat less than a year ago, but in March a considerable gain has been shown, and these exports would have been considerably larger had producers been able to meet the demands from abroad. It is safe to say that at the present time there is little or no metal to be had for immediate delivery, or in fact, for at least two months to come, and large orders for May and June cannot easily be placed. The demand from consumers continues, however, and it looks as though it would be a little difficult to satisfy their requirements, unless the rising price should operate to limit consumption, and of this there seems to be no present indication.

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MARKET CONDITIONS.

The metal markets continue strong, without exception. The demand in all quarters is very large and manufacturers are taking a great deal of material even at the advanced prices.

Copper continues to advance both here and on the European markets. The question of copper prices is more fully considered in another column.

Tin prices continue high and it is claimed that they are justified by the short supplies in sight. Speculation in London has been strong; spot metal appears to be pretty closely held, and sellers for the time being have the advantage.

Another advance has been recorded in lead, the price having been increased 30c. per 100 lbs. in New York. The smelters, however, have not given the miners the full advantage of this rise, as they did in the recent advance. The price paid for lead in ores at Western points has been increased only 15c., making it $3.90 per 100 lbs. It is claimed that the demand for immediate delivery has been so great that the smelters have been obliged to enter for consumption some Mexican lead, which had been refined here in bond, and was held for export. This was partly due to the large requirements of consumers, and partly to the delay in receipts of lead from the West.

Spelter is very strong. Both galvanizers and brass manufacturers have been buying freely and sellers have found some difficulty in delivering metal as fast as required. Prices of ores have also risen, as is shown by our Western correspondence. This is partly due to the demand from smelters, and partly to the delay in delivering ores, resulting from stormy weather and bad roads in the Joplin District.

Silver continues fairly firm at or near the advance noted last week. Some small orders for coinage for Europe have been filled, but the market has been supported in part by an increase in demand from the Indian bazars, and in part by the covering of speculative requirements in London.

The iron market shows no material change from last week. The demand for bessemer and basic pig for the second half of the year does not seem to have been satisfied by any means. Foundry also has been in strong demand from builders of machinery and agricultural implements and from the cast-iron pipe people. Production is improving somewhat, and the railroads seem to be doing a little better in delivering fuel to the mills. There is still a good deal of discussion going on over purchases of Lake ore for the season and final settlements have not in all cases been reached. The principal difficulty at present with the blast furnaces is in contracting for supplies of coke for the remainder of the year.

In finished material, business is active, especially in plates and bars, while the demand for structural steel continues unabated.

Import business continues fairly active. Business is improving, however, both in Germany and in Great Britain, and among foreign sellers there is less inclination to make concessions. This feeling may limit the amount of import business.

In the Western coal trade transportation shows some improvement, and the markets in the large cities are more quiet in view of this, and also of the mild weather, which is diminishing the demand for fuel. Arrangements are now being made for the Lake trade which, as we have already noted, will probably begin at an early date this year, but no settlement has been reached between shippers and vessel-men as to opening rates.

The Seaboard bituminous trade continues quiet, with tidewater prices, if anything, weaker. Car supply at the mines shows a small improvement and transportation is fairly good. Labor troubles still threaten operators in some districts in West Virginia and Maryland.

The anthracite trade is waiting for the report of the Arbitration Commission, since that report will doubtless influence greatly the attitude of the operators towards lower prices to stimulate spring mining. In the meantime, trade along the seaboard remains quiet, although there is a good demand at inland points, particularly in the West. Lake navigation promises to open this year very early, an event which will benefit consumers and dealers at upper Lake points and mine operators.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

EUTECTIC OR BENMUTIC.

To the Editor:

Sir.—In your issue of January 24, 1903, you publish a very interesting communication from Prof. Howe, entitled "Eutectic or Benmutic," in which the author suggests the use of the latter term instead of the former to designate steel made up exclusively of pearlite. This important change in the nomenclature of metallographic terms appears to me undesirable, and I shall venture to briefly state my reasons for this. The word "eutectic" was, as Prof. Howe rightly says, first applied by Guthrie to that member of a series of alloys made up of various proportions of the same constituents, which had the lowest melting point. Pearlite, that is, iron containing about 0.80 per cent of carbon, is not the alloy with the lowest melting point of the iron-carbon series, and in this consideration we find at first sight, a weighty argument against the term "eutectic" being applied to this alloy. It should, however, be borne in mind that if pearlite is not the true eutectic mixture of a molten alloy, that is, of a liquid solution, it is the true eutectic alloy of a *solid solution.* We should not lose sight of the fact that steel after it has solidified becomes a solid solution, and that during its further cooling, the various components fall out of solution, in a manner singularly suggestive of the solidification of the constituents of liquid solutions, and pearlite is the true eutectic alloy of this solid solution, inasmuch as it is the last one to fall out of solution. The analogies between pearlite and eutectic alloys in general are indeed very striking. Witness the branch of curve which, in the cooling curve of carburized irons, corresponds to the formation of pearlite; witness also the structure of pearlite so characteristic of all eutectic mixtures. It only differs from the eutectic alloys with which we are better acquainted in the fact that it is a constituent of last consolidation of a solid instead of a liquid solution. In view of those considerations, it appears to me preferable to retain the term eutectic for these constituents of solid solutions so similar to the eutectic alloy of liquid solutions, and in order to remove the objection pointed out by Prof. Howe, to slightly broaden the meaning of the word eutectic, so that it may be applied to the constituent or alloy of last *consolidation,* alike of liquid and of solid solutions. By impressing students with the fact that pearlite is the eutectic alloy of a solid solution and not of a liquid solution, would not the confusion to which Prof. Howe alludes, be avoided?

As to Prof. Howe's suggestion to give the name of "Osmondite" to the solid solution of iron and carbon existing in a stable condition above the critical range of steel, all metallographists would, I believe, recognize the justice of attaching Osmond's name to a term of the nomenclature of a subject to the progress of which he has contributed more than any one else, and they would welcome this addition; but has not Osmond himself proposed long ago the name of austenite for this solid solution?

ALBERT SAUVEUR.

Harvard University, Cambridge, Mass.,
March 9, 1903.

ORE DEVELOPED.

To the Editor:

Sir.—The article by Mr. Argall in your issue of February 14 on the merits or demerits of the old-fashioned expression of "ore in sight" is of great interest to the profession, and the result of the different views which it will bring forward should induce a change in terms such as, it appears, is very much needed.

Taking advantage of the opportunity of discussing this subject, I would suggest the following terms:

Ore Blocked.—Such bodies as are accessible on all sides, that can be accurately measured and thoroughly sampled, and the values of which can be reliably determined.

Ore Partly Blocked.—Those bodies that are only partially developed, and the values of which can only be approximately determined.

Ore Faces.—Would designate those bodies that are exposed on one side or show only one face, and whose values can only be determined in a prospective manner as deduced from the general condition of the mine or prospect.

G. M. GOUYARD.

Denver, Colo., Feb. 20, 1903.

ON SAMPLING THE FLOOR OF A WET LEVEL.

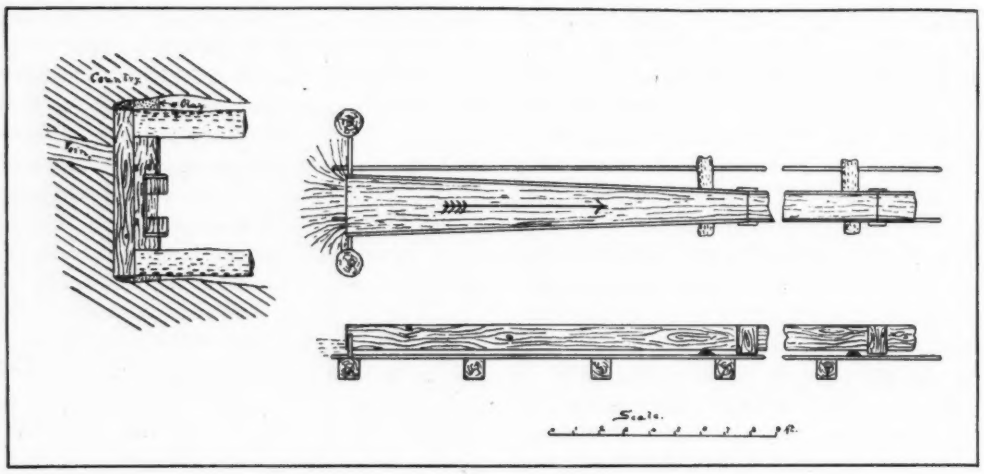
To the Editor:

Sir.—I have read the articles by Mr. T. A. Rickard on sampling of ore with great interest, and it gives me pleasure to contribute some data upon one branch of the subject, which has lately come within my experience. I refer to the sampling of the bottom of a wet level.

This is by no means a pleasant or easy branch of sampling, neither can the sample procured be expected to be as accurate as one taken in a back or wall, since the ore broken along the groove made by the moil remains more or less in place until collected by hand and, in doing this, one allows many of the smaller pieces to escape. The tendency, therefore, is rather to obtain under-average values, because the richest ore is usually the most brittle. On the other hand, however, the cracks in the floor of a level form a good receptacle for, and in general, become filled with, the rich fines, and this would ordinarily tend to give over-average values; but, in the case to be described, water was always at hand, and by washing each sample carefully this source of error was eliminated.

All samples were taken in the usual way, by chipping a straight groove across the vein with the aid of a hammer and moil. In places we tried shooting, but found it unsatisfactory. The flow of water was about 300 gals. per minute, nearly all of which, in most cases, we successfully dammed back and carried in a flume over that stretch of level being sampled. The grade of the level was usually enough to keep the head of the flume higher than the discharge, but in places where the floor was flat or where it sagged, the difficulty was overcome by making the dam one plank or more higher; in all such cases the dam should be kept as low as possible, otherwise the unnecessary pressure behind it will accelerate leakage. The dam consisted of a 2-in. plank, 12 ins. wide and 4 ft. 6 ins. long, the level being timbered with sets, 4 ft. 6 ins. between the timbers, at 5 ft. intervals. The mud and loose rock were removed from the sill, and the dam spiked on it, all passages for water being stopped up with clay procured in neighboring workings of the mine, or with thick mud when the supply of clay gave out. Nailing the dam to the side of the sill was tried, but this failed to keep out the water as effectually.

The flume was 12 by 10 ins. inside cross-section and was made by nailing together three 12 by 2-in. planks in sections of 16 and 9 ft., the longer ones being used for the straight parts of the level and the shorter ones for the curves. The inlet section was made wedge shaped, being 1 ft. wide at its lower end and 2 ft. 3 ins. at the dam end; the latter end fitted into a recess sawn in the dam. On the lower end of each section, overlapping it by 4 ins. was nailed a collar, made of two 14 by 8 by 2-in. planks at the sides and one 12 by 8 by 2 ins. at the bottom, and in putting up the flume the head end of each section was laid in the protruding half of the collar on the section above and made water-tight with clay. At first we had the collars made of 1-in. plank, but these proved unserviceable, because they were apt to be broken by the rough handling, accompanying the shifting of the flume. To give the flume a fairly even grade, it was blocked up underneath with timbers. With three samplers, taking samples at 10-ft. intervals, it was found that a stretch of 200 ft. usually required a full day's work; the time, of course, varied with the local conditions, in this particular case the veins did not exceed an average width of 2 ft.



FLUME FOR USE IN SAMPLING IN WET GROUND.

The way the work was conducted was as follows: On the previous shift a gang of men took up the rails, removed the loose dirt, which was one to two feet deep, and relaid the rails so that the flume could be brought in upon timber trucks. The rails were originally spiked to sleepers above the sills, but were relaid on the sills so that the track was lowered 6 to 12 ins. The flume was then laid on that side of the level opposite to that occupied by the vein. The places to be sampled were then marked off and men were set to work to shovel the remaining dirt to one side and pick down trenches as far as the ore in place and bail out the water which oozed through. For bailing they used tomato cans. This was slow and tedious work; often it became necessary to build a small clay dam on that side of the trench from which the water came or even all round it, or else to dig another trench just above the place where the sample was to be taken and bail from it.

If the vein be of such a nature that it breaks in slabs parallel to its strike, an accurate sample can be taken from under water; if not, it becomes necessary to make the trench dry because the muddy water prevents one from seeing what is being done.

Should the vein jump from one side to the other, it is advisable to take all samples on the one side first, then move the flume and take those on the other side. In regard to starting the samples at the lower end of the stretch first and working upwards, or vice versa, the local conditions of each stretch have to be taken into consideration. As regards working up or down the level, owing to the removal of dirt and lowering of the track, work must of necessity commence at the lower end.

The first day we used a 15-in. galvanized iron pipe in place of the flume, but found it unsatisfactory for many reasons. It takes too much time to put the

sections together, also the pipe cannot be made to follow the bends of the level as easily as a flume can. It cannot be sawn or cut to any desired length as easily. By being open along its whole length a flume possesses another great advantage over a pipe: in the case of a cross-cut conducting extra water into that stretch of level being sampled, a clay dam with a 4-in. pipe leading into the flume was found sufficient to rid that part of the level of the extra inflow. The water bailed from the trenches could be poured straight into the flume, whereas, with the use of a pipe much inconvenience and loss of time was occasioned by the water bailed from the trench above running down and filling the lower ones. The cost of the pipe was 95c. per foot, and that of the flume 17c. (timber at the mine in question costing $20 per 1,000 ft.). With the exception of its lighter weight which, on account of the small amount of moving necessary, is of no moment, it is obvious that the flume possesses all the advantages.

The accompanying sketch shows the plan, side elevation and end elevation of the flume.

ERNEST LEVY.

Denver, Colo., Feb. 25, 1903.

ANCIENT GOLD MINING.

To the Editor:

Sir.—Apropos of the interesting comment on "The Gold of Ophir" in your issue of February 21, 1903, I submit the following notes regarding ancient sources of gold in Asia. I extracted them recently from a work entitled "Voyage Scientifique dans l'Altai Oriental," by Pierre de Tchihatchef, Paris, 1845.

Quoting from von Humboldt ("Asie Centrale," a book at present inaccessible to me), Tchihatchef states that the seat of the Arimaspi of Herodotus was the northern slope of the Altai. The region furnished gold to the Greeks of the ancient Khersonese through the medium of the Issedons, who inhabited the country lying about Karkorolinsk and Semipalatinsk, to the north of the Lake Balkash.

Tchihatchef refers to the extraordinary finds of massive gold ornaments which have been discovered in the tombs of Kertch, in the district containing the site of the ancient Panticapaeum, and examples of which may now be seen in the collections of the Ermitage Museum of St. Petersburg. He pointed out that in the eastern Hellenic colonies the art of the goldsmith was earlier and more highly developed than in Greece itself. He says it is natural to think that the Greek colonies of the Euxine Sea, established as the most advanced posts of civilization on the barbarian frontier, took advantage of their position to acquire all the gold product of the Altai, and such as may have come from the Ural.

Tchihatchef saw many traces of ancient workings in the Kolyvan district of the Altai, and he assigns these workings to the Chudi, a people of Finnish stock formerly inhabiting that district.

The gold objects of art now preserved at St. Petersburg date from the third and fourth centuries before Christ. In support of the hypothesis that north central Asia was the source of the gold used by the Greeks, Tchihatchef says that nothing is more remarkable than the rarity of gold in the Athenian remains, compared with its profusion in the relics from Panticapaeum. In the tombs of Kertch objects in gold and electrum are found which were evidently of an ordinary or secondary order of usage.

As regards the origin of the legend of the "Golden Fleece," Tchihatchef calls attention to the theory of von Humboldt that the fleece of goats was used as a method of saving gold among the ancients, as it is in places at present. In the vicinity of Phasa, in the Caucasus, the kings of Imeret, in the eighteenth century, used goats' fleece for saving gold from the auriferous gravels of the Tskinitskali and Abacha rivers. This region, according to Tchihatchef, is where the ancients placed the site of the Golden Fleece. Tchihatchef states that fleece of goats was used in the nineteenth century by Turkish Gypsies in the gold washings of the river Belichta, and quotes Strabo ("Geography") as saying that the Soanes of the ancient country of Colchis formerly followed the same practice.

The question of the sources of the gold of antiquity is one of fascinating interest. I, therefore, am induced to present the above notes, incomplete and fragmentary as they are, in the hope that those investigators who are familiar with the subject will enter into its discussion.

C. W. PURINGTON.

Denver, Colo., March 4, 1903.

METALLURGICAL METHODS AT KALGOORLIE, W. A.

To the Editor:

Sir.—My attention has been called to an article in your issue of January 24, from Mr. E. Barton Hack, upon Kalgoorlie ore treatment, and a letter from Mr. Hack in your issue of February 14, traversing some statements of Mr. Alfred James upon the Diehl Process, for the introduction of which into West Australia my firm is responsible.

In Mr. Hack's first article, he attributed the introduction of the filter-press for slimes treatment to the Lake View Consols metallurgist. The first filter-press was introduced by the Hannan's Brownhill, six months before the Lake View Consols, nor was the idea of adapting the sugar filter-press for the separation of solutions from slimes new at that time.

Mr. Hack, in both articles, intimates that the Diehl process has not been a success, which is distinctly erroneous. The process, in general, undertakes to extract the gold from telluride ores, without roasting, by wet stamp milling and grinding all products to slimes, and treatment with bromo-cyanide, the solutions being separated and water recovered by filter-presses. The average extraction is about 94 per cent, and the costs, including superintendenec and every charge, are on the Lake View Consols Mine—where 6,500 tons are treated monthly—$4.30 per ton. This plant is an adaptation of a former mill, and not as economical as a mill built especially for the work would be, more particularly in the power costs being excessive. In the Oroya Brownhill plant, treating 3,000 tons per month, the costs are $5.30, but here the ore is double the value of any other mine on the field and contains a less percentage of free gold and more telluride, averaging 2.5 oz. per ton, and rich ores require longer treatment and greater consumption of chemicals. There is no doubt that the process will be worked at Kalgoorlie for under $4, and no greater refutation of Mr. Hack's intimations can be found than that the Horseshoe Company are now re-organizing their plant to use the Diehl process, and the Ivanhoe are contemplating the same move as to a portion of their output.

None of the roasting processes work under $5 per ton, and most of them $0.75 to $1 above it. On the Boulder Main Reef, mentioned by Mr. Hack, the costs are not $4.32, but average for the year 1901 $6.20, and for 1902 $6.01 per ton.

When one considers that power, under the best conditions, at Kalgoorlie, costs $19 per horsepower per month, that, although the consumption of salt water is only about 200 gals. per ton of ore, it still costs $0.75 to $1.50 per 1,000 gals., etc., it occurs to one that Cripple Creek metallurgists could well investigate the progress at Kalgoorlie for, on the basis of comparative cost of power, etc., the minimum of water required for the Diehl process; and the non-necessity of roasting, it could be applied directly upon the Cripple Creek mines themselves and worked for one-half their present costs of treatment.

H. C. HOOVER.

London, March 3, 1903.

To the Editor:

Sir.—The comments of Mr. E. Barton Hack in your issue of the 14th inst., regarding the Diehl process in Western Australia and the form of agitators employed, as well as the filling of filter-presses by plunger pumps, are apparently due to a lack of touch with recent developments at Kalgoorlie, or he would have known of the great success of the Diehl process with the Hannan's Star, Brownhill Oroya, Brownhill Extended, Lake View, and other ores. Mr. Hack also is apparently not well informed regarding the process itself, for any one who refers to the loss of "dust" in the spitzlutten only exposes his ignorance of the details of a wet process of concentration, which can form no dust. If Mr. Hack means "slimes," he has shown in the next paragraph that the multi-bottom spitzkasten have proved quite efficient for collecting these.

With reference to the disuse of raising gear on agitators, the use of large conical settling vats, and the filling of filter-presses by pumps, Mr. Hack's statements are not in accordance with my own observations nor the experience of some of the most prominent managers at Kalgoorlie.

Mr. Hamilton, of the Great Boulder, cabled me on January 24, 1903, that filling presses by pumps was cheaper than the use of compressed air, and not only has the Golden Horseshoe used this method for some years (Mr. Hack says, "recently initiated"), but the Peak Hill, and, more recently, the Lake View, fill their presses by pumps instead of by montejus. The addition of a large accumulator between the pumps and the presses makes all the difference and permits of a regulated and equalized pressure.

Some time since I read with interest a paper by Mr. Hack in a Denver paper, dated December 11. It is evident that Mr. Hack cannot be in touch with his subject. Perforated plates and double filter-pressing have both been universally discarded for many months. No one in his senses would now dream of agitating for a short period until only 35 per cent of the gold is extracted and endeavoring to recover the balance in the press. This may have been the experimental practice of the last century, but it is certainly not the method now employed at the Great Boulder Perseverance, nor are woolen filter-cloths in use there.

Mr. Hack's statement in a Denver paper of the amount of air required per press amounts to a consumption of exactly 85 horse-power—perhaps he did not know this—or, say, a total of 1,100 horse-power for the battery of 13 filter-presses at the Perseverance. As a matter of fact, the actual power consumed at this mine for all the filter-presses in use there, ten in number, is 134 horse-power, and is obtained from an 18-in. Ingersoll Sergeant straight-line compressor.

In commenting on recent practice, Mr. Hack, who, I am advised by Mr. Nichols, was employed at the Perseverance so long ago as 1901, would surely have been better advised to have got his facts correct. As it is, he appears to have been dealing with a subject with which he is not accurately conversant, and to be unaware of the vast strides which have been made in the economical and effective working of the metallurgical processes since he was at Kalgoorlie.

ALFRED JAMES.

London, Feb. 26, 1903.

GERMAN IRON PRODUCTION.—The production of pig iron in Germany in January is reported as follows, in metric tons:

	Tons.	%
Foundry iron	144,405	18.5
Forge iron	72,128	9.2
Bessemer pig	26,857	3.4
Thomas (basic) pig	461,839	59.0
Steel pig	77,255	9.9
Total	782,484	100.0

This shows an increase of 125,796 tons, or 19.1 per cent, over January, 1902. The German Iron and Steel Association has adopted a new classification; instead of including special irons with forge iron, the new heading "steel pig" has been introduced, which includes spiegeleisen, ferro-manganese, ferro-silicon and all similar alloys.

THE SAMPLING AND ESTIMATION OF ORE IN A MINE—V.

BY T. A. RICKARD.

(*Continued from page 363.*)

THE POSSIBLE DISCREPANCIES BETWEEN SAMPLING AND MINING.

In sampling the workings it is necessary that the engineer should have an eye to the manner in which the mine is being worked. It is useless, for instance, to sample two feet of vein matter without any regard to the fact that in stoping it is the practice to remove a width of four feet. Unless judgment is exercised, the samples are apt to represent cleaner ore than the output of the mine, so that the estimates based upon them will be misleading. The material sent for treatment to mill or smelter may differ from the ore, composing the lode as seen in the mine, in several respects. Thus:

A. The lode may be smaller than the minimum width removed in stoping, so as to necessitate the mining of a certain portion of barren rock.

B. The lode may be as wide as the convenient size for stoping, but it may have a casing of soft rock, which breaks down with the ore and becomes mingled with it so as to increase the tonnage and diminish the average yield per ton.

C. The lode may be built of one or more streaks of rich ore irregularly distributed through it, so that in stoping it is necessary to break down a large and variable width.

In the preliminary trip through the mine the engineer will be able to find out by observation, together with the information obtainable from either the foreman or the manager, how the ground is being worked, and how the ore is being handled. If he does not secure these data at the preliminary examination he will light upon them in the course of his investigations into costs, for without them the relative expenditures at mine and mill will be contradictory, if not unintelligible.

Concerning the conditions first mentioned, under the heading A, it is obvious that the width broken in stoping has a minimum, which in ordinary practice varies according to the method employed; that is, with hand labor a width of two to three feet will ordinarily suffice; while at least three to four feet is necessary when machine drills are used.[1] In both cases this minimum width will be exceeded if the rock is very hard or if it breaks along easy lines of fracture, which cause more rock to come away in blasting than is absolutely required for mere convenience in working. If the streak of ore is less than the width of the stope there will be, inevitably, an admixture of waste, except in the rare cases where it is practicable to strip the pay-streaks, that is, stope the country without removing the vein, which is subsequently taken down separately. This method, which is covered by the Cornish term "resue," is excellent when the vein of ore is narrow, but it depends for success upon the ore being closely attached or "frozen" to one of the vein walls, so that it is not shaken down when the adjoining waste is shot away. In many mines in Colorado, Montana and Idaho, especially in the case of narrow streaks of very rich silver ore, it is not unusual to spread canvas or sacking along the floor of the stope and then break down the ore upon it, which in this way is kept free from admixture with waste, and can be sacked without any sorting. The canvas is covered for protection with 6 by 3 by 12-in. timbers. In such a mine as this the sampling of the vein itself would give data which closely approximate the actual returns from ore sent away to the smelter.

When it is not possible to mine the ore separately from the waste it is usual to pass it over the sorting tables, where the waste is picked out by hand. In the determination of the percentage thus eliminated lies the difficulty of getting the proper relation between the assays of the ore as sampled and the value of the material as sent to the reduction works. Unless this is determined, and the sampling is corrected in accordance, the figures of the engineer will not harmonize with the results of future operations. The most practical way to find out the percentage sorted out is to measure the ground stoped during a given period, and, knowing the tonnage extracted from such a particular block of ground, to determine the average width of clean ore actually obtained from that block. If the average width of the vein is fairly consistent one can, from these data, deduce the amount of waste which gets mingled with the pay-streak and then correct the assay returns, from sampling, accordingly.

However, gold-veins are rarely uniform in width, and, moreover, any given mine may contain several lodes, the output of which is not kept separate. In such localities as Kalgoorlie and Cripple Creek where the veins are rich, erratic, and so diffuse in their mineralization as to make it compulsory to break down a great deal of waste in extracting a small width of clean ore; where, also, the large mines include within their boundaries two or three distinct lodes of variable width and richness, it becomes an extremely difficult task for an engineer to determine, within the short period of his inspection, to what degree the veinstuff is mixed up with waste. An example will emphasize the matter under discussion. Take a lode or series of lodes having an average width of one foot of four-ounce ore. Assume, as is usually the case, that a width of at least four feet of rock is actually removed in mining, so that one foot of ore is shot down with three feet of waste. If you sample the vein alone you get an average of four ounces of gold per ton; if you sample the four feet of stoping width you get an average of one ounce per ton, unless there happen to be one or more stringers of ore outside the main pay-streak, not rich enough to be worked on their own account, but near enough to the vein proper to be included within the ground which is removed. In this case the average may become slightly higher than the figure which is based on the supposition that the extra three feet is barren material. That is a detail. The point to be emphasized is that the product of the mine will be more than the tonnage based on one foot of ore and a good deal less than the tonnage based upon the stoping width; more is broken than one foot, because mining does not copy sampling methods, and less is shipped than four feet, by reason of the sorting which intervenes between stope and smelter. Similarly, as to average value, the production of the mine will average less than the four ounces in the clean ore, but more than the one ounce which is the assay value of the stope.

At Cripple Creek, and in other districts where the costs of transport and treatment are high, this four feet, or more, of ore is sent to the ore-house and is hand sorted. It may have been first culled underground, the large pieces of waste being retained on the stulls. This is the practice in most mines. In any event, a certain proportion of waste is thrown out, and it is only the remainder that is milled or marketed. What is that proportion which is taken out?

Here lies the difficulty which has been at the bottom of many an erroneous estimate. If the engineer is pressed for time, by reason of agreements made between the buyer and seller of the mine, he will not have the opportunity to conduct such tests as would give him the requisite data. The management is apt to have loose ideas on the subject, the ratio of waste eliminated to clean ore actually shipped will vary from week to week, just as the different stopes underground will change from time to time, so that it is rarely possible within the period of a brief examination to get, save at second-hand, at the percentage which so seriously affects all calculations. Under these conditions the only thing to do is to state the results just as they are obtained, explaining how they are obtained, and then make the correction which judgment dictates. If the vein has been sampled by itself then an addition for the unavoidable admixture with waste must be estimated, the amount being based upon the observation both above and underground. If the sampling has included the full stoping width then a similar correction must be made for the amount of material subsequently removed by sorting, otherwise the statement of sampling returns may prove unintelligible, it being not uncommon for the average value of the ore as stoped, before sorting, to be less than that of the total working costs.

However, except in the unpleasant circumstances of limited time due to the unavoidable exigencies of business, which unfortunately do often hamper, hinder and obstruct the engineer in his professional work, it is possible to arrive at the ratio of ore and waste, and, therefore, to formulate accurate estimates. It requires time and it needs money, but, in the examination of large mines nowadays it is appreciated by financiers and syndicates employing first-class engineers that they must make provision for plenty of time and money in order to get good men to do good work. This may seem a digression, but it vitally affects the consideration of this branch of the subject under discussion.

When, therefore, conditions do permit of every precaution, the engineer will cause the ore, as it comes to the surface, to be weighed, he will get the weight of the clean ore after sorting, and he will check this with the weight of the material which goes over the dump. He will also take samples of the dump to correct his estimate of the average values. The weighing and sampling will, of course, be done by his own men. He will also take careful note of any waste which is retained underground, as is usually the case in a well-managed mine. If this is done during the space of a month or so, which is the minimum period permissible for an important examination, he will have data enough to enable him to correct the results secured from the sampling of the mine. In the suppositious case, quoted above, the one foot of four-ounce ore would be mined (and sampled) with three times as much waste, one-half of the latter would be sorted out and with it would go some of the fines, so that the net result might be about two feet of ore assaying 1.75 oz. and two feet of waste assaying about 0.25 oz. per ton.

These final estimates should be borne out by the future record of the mine. As a safeguard, however, the engineer ought to state in detail, in his report, how he arrived at his figures, lest, later on, an ignorant directorate or an unscrupulous manager should either work more than a proper width, in order to get an increase in tonnage, or mine only the richest portion of the lode with a view to a brief period of inflated returns. Such things have happened and honest men have been drawn into the blame which followed.

Coming to the consideration of the second point, specified under B, it is evident that here also there is room for error. In most lodes of gold-bearing quartz, where sorting is out of the question on account of the low grade of the ore and the uncertain dissemination of the gold, it is not possible to break the ore in the stopes as clean as it is broken in the course of sampling. Should the lode be free from an admixture of country it is nevertheless rarely practicable to stope it without bringing down some of the encasing rock. This is slight in some instances of very well-defined quartz veins, large enough to admit of a full-sized stope and so separated by selvages from the wall-rock as to come clear away. In most instances, however, the stoping will include a considerable proportion of waste,

[1] A small (2¼-in. cylinder) drill usually requires a stope of 3½ to 4 ft. in width, the large air drills (with 3¼-in. cylinder) take from 4½ to 5 ft.

and when it happens, as is not infrequent, especially with large generous ore-deposits, that the lode throws out branch-veins or is enriched by feeders, then it will be found that there is a very considerable admixture of comparatively barren rock.

Circumstances such as these, overlooked or underestimated, have been at the root of the differences between the estimates of capable engineers and the subsequent record of the mines they have reported upon. Managers, as a rule, like to emphasize the clean-cut character of their operations, and are apt to accentuate the fact that the ore "breaks easy" and free from wall-rock. Moreover, in all mining, there is an element of the unexpected, which in this case takes the form of the breaking away of "slabs" of wall-rock, the admixture of large pieces of "casing," the occasional "horse" or intrusion of barren rock amid a width of ore, and other contingencies, all of which tend inevitably to an increase of tonnage and a diminution in the average value of the output. One must look for these features in a mine and obtain data sufficient to warrant an estimate of their perturbing influence upon the accuracy of those calculations which are at first based solely on the results of sampling.

The third subdivision, C, includes a large proportion of the big low-grade lodes from which so much of the metallic wealth of the world is derived. An examination of a mine is usually confined to those workings which are confessedly profitable or likely to become so. The non-payable workings are neglected. In actual mining, however, a level or a raise is apt to be carried forward through poor ground in the hope of encountering better ore, and it is not uncommon to remove blocks of unprofitable ground lying between good stopes because of practical convenience in working. In this way there is a tendency to vitiate the results of sampling, if not corrected in accordance with a recognition of such indubitable facts. Moreover, in the working of large deposits of low-grade ore, where the width to be removed is not determined by well-defined boundaries, but is left to the arbitrament of the assay, as a consequence of a diffused impregnation of ore, there is a tendency to increase the stoping width. The result of a steady diminution in working costs, due to better maangement, equipment and economic conditions, is to permit of the exploitation of poorer ores. This leads to the utilization of neglected stopes, previously considered unprofitable, and the enlargement of the stoping width so as to include more and more of the outer poorer edges of the lode. An increase in the capacity of the mill is usually followed by a drop in the average value of the output. On the Rand this tendency has become very marked, thus, for example, most of the original estimates of the life of particular mines were based on ore-reserves calculated upon the basis of a certain width of "banket," but since the substitution of rock-drills for hand labor it has been found advisable, consequent upon observation and experience, to increase the stoping width by as much as 50 per cent. This increase has necessitated the breaking of a large amount of barren rock, but a compensatory factor has been found in the introduction of revolving circular tables which facilitate the picking out of the waste by natives.

These are considerations which the engineer must keep in mind. He is not expected to write next year's almanac, but if he is to be justified by the actual record of the mine, his report must be aided by some of that farsightedness and shrewdness which is necessary to a successful meteorological forecast.

(To be continued.)

PROSPECTING FOR COAL IN FRANCE.—Prospecting for coal in the east of France has not, on the whole, led to any considerable results. A layer, however, has been found in the Etion-Charleville District, and a company is being formed to work it. It is said that there is a coal basin taking in the lower valley of the Chiers and the valley of the Meuse, between Sedan and Charleville. Meanwhile the Germans are very busy on the other side of the frontier.

VOLCANIC ORIGIN OF NATURAL GAS AND PETROLEUM.*

BY EUGENE COSTE.

In this very interesting paper, by the new president of the Canadian Mining Institute, the subject is considered in a comprehensive way, and a great number of diverse data have been brought together in support of the theory that natural gas and petroleum are of volcanic origin. We quote the concluding portions of the paper, when, after having marshaled an array of facts favorable to his explanation of oil phenomena, Mr. Coste combats the commonly accepted theories of organic origin:

We have shown that volcanic emanations of hydrocarbons are a natural geological process of to-day, abundantly verified and witnessed in actual operation in volcanic eruptions and phenomena all over the world.

Can as much be said of any of the theories generally advanced to explain the organic origin of hydrocarbons? Evidently not! None of the processes called on by these organic theories are to be witnessed in operation anywhere in nature to-day. The late Prof. Edward Orton, a profound believer in, and a strong defender of, the organic origin of petroleum, acknowledged this point plainly when he said in his presidential address before the Geological Society of America: "It is easy to see how the bituminous series may result from the destructive distillation of either vegetable or animal substances enclosed in the rocks, and wherever conditions can be shown that provide for such distillation we are not obliged to go further in our search. Destructive distillation can take effect in organic matter that has attained a permanent or stable condition in the rocks, like the carbonaceous matter of black shales or coal; but it seems improbable on many and obvious grounds that this can be the normal and orderly process of petroleum production. This production of petroleum must be in active operation in the world to-day; at least, it seems highly improbable that a process coeval with the kingdoms of life, growing with their growth and strengthening with their strength, a process that was certainly in its highest activity throughout Tertiary time, leaving a most important record in the rocks of that age, should suddenly and completely disappear from the scene upon which it had wrought so long, and upon which all other conditions appear to be substantially unchanged."[1] We have seen above how far from having disappeared from the scene is the volcanic process of petroleum production, but Prof. Orton was only looking to find in nature a petroleum production process "coeval with the kingdoms of life" and *that* he could not find simply because it does not and never did exist. To us this is most clearly proved by the simple consideration of the natural geological processes of decomposition of organic remains and of the conditions obtaining in the oil and gas fields. First, it is quite certain that the decomposition of animal bodies, as taking place in nature to-day and doubtless during all ages, is so rapid that the decay or combustion is complete before the entombment in the sedimentary rocks of these animal bodies, preserved in any way, can possibly take place. This is no doubt why instances are so rarely cited in geology of partially decomposed and preserved remains of animal bodies being found; only most exceptional cases, such as a few remains preserved in the antiseptic waters of peat bogs or a few frozen remains of *elephas,* are given; but these exceptions only confirm the rule, which is, that when there is anything left at all it is the shell or bones or their moulds or casts, and no trace of the body is to be found. The fact that a few shells have sometimes been found full of petroleum is a conclusive proof that this oil is a subsequent infiltration into the shell as in the case of silt, silicia, pyrite, calcite and many other minerals—filling shells—a modicum of oil is all each shell would contain if the petroleum originated from the body and invariably when petroleum is found in fossil shells it is also found in the porous or seamed strata in which the shells are embedded, showing that the infiltration and impregnation have been from without.

Second.—It is also equally certain that there is but one normal process of decomposition and preservation of vegetable organic matter in nature to-day and in ages past, and that is the decomposition of it into carbonaceous matter, viz., peat, lignite and coal. This process is in active operation in the world to-day, as it always has been, and it is the only normal process "coeval with the kingdoms of life" that geology teaches us. Not one single authentic instance can be adduced from the actual normal processes of nature of any decomposition of organic matter "primarily" into petroleum. How could it be? The same condition of low temperatures and of all other factors entering into the normal decomposition of vegetable remains must give only the one result, and cannot possibly give two different ones, especially in the same strata and at the same places, because oil sands and coal beds are often contiguous. If then we do not find carbonaceous matter in any quantity below the Carboniferous period, as the A, B, C of geology teaches us that we do not, the simple reason of it is, as long ago admitted by geologists, that, before that period, the condition favorable to vegetable growth had not yet developed to any extent, and not that it was transformed into petroleum, as attested by the small quantity of carbonaceous matter found in the Devonian and Silurian strata which are witness and proof that the one normal process of decomposition of vegetable matter into coal was then already going on.

Then, since animal organisms were never entombed in the rocks, and since vegetable life was quite insufficient before the Carboniferous age, how can the theories of organic origin be adduced to explain all the oil and gas found below the Carboniferous; and that means all the enormous quantities of oil and gas of the Lower Silurian limestone of Ohio and Indiana, and it also means almost all of the very large quantities of oil and gas developed in the last 40 years along the Appalachian belt, which has been found under the coal in the Lower and Sub-Carboniferous, Devonian and Silurian; and, much more, in other fields. The fact often cited by the numerous exponents of the organic theories, as in the above quotation of the late Prof. Edward Orton, that by destructive distillation petroleum and gas can be obtained from coal or carbonaceous matter, and also from fish oil, lard oil or linseed oil, etc.,[2] will not serve here at all, for not only was there too little to distill in the rocks prior to the Carboniferous, but what little there was was not distilled, and is to be found there to-day, undistilled, as the Paleozoic oil rocks of the oil regions of North America have certainly remained unaffected by metamorphic agencies, and have never been subjected to the heat necessary to effect this distillation of organic matter. Nor have the rocks of the Texas section; and yet we have seen that petroleum, gas and asphalt are found in them from the Ordovician to the Quaternary. This destructive distillation of carbonaceous matter (and, we repeat, there is no other organic matter entombed in the sedimentary rocks but carbonaceous matter), could not possibly take place without leaving a residue of coke and of ash, and not only have these residues never been found under the oil and gas-fields, but we know for certain that they do not exist.

In fact, if this distillation had taken place, there would be no coal-fields anywhere, as they would all have been changed into coke beds.

We see, therefore, to what absurd deductions we are led by the theory of the organic origin of petroleum: 1. Abundance of vegetable life before the Carboniferous.

2. No coal anywhere on the globe.

* Abstract from paper read before the Canadian Mining Institute, March, 1903.

[1] *Bulletin* Geological Society of America, Vol. 9.

[2] Prof. E. Orton, *Bulletin* Geological Society of America, Vol. 9, pp. 88-89.

MINAS NUEVAS, PARRAL, MEXICO.

BY G. A. BURR, PARRAL, AND LOUIS S. CATES, BOSTON.

(*Continued from page 406.*)

Veta Grande and El Verde.—The first discovery made on the Veta Colorada was that of the Veta Grande Mine in 1645, and until within the last few years this property was worked with very little intermission.

The Veta Grande and El Verde mines are considered as one property, being under the same ownership. The deepest workings are 1,000 ft. below the outcrop. Neither of the writers have ever entered the lower workings, which for several years have been under water. Old workmen employed on the mine, while the lower workings were being exploited, state that the ore-body is not high-grade, but it is very large and the ore is hard. They describe the principal shoot of ore as being about 40 ft. thick.

These properties were recently transferred for the sum of $250,000. The dumps are the largest on the vein, and the purchasers probably will net an amount from them equal to the purchase price of the properties.

Quebradillas adjoins the Veta Grande and Verde mines to the north. While this property was distons per month is considered the normal output of this mine, but with the utilization of lower-grade ores the output could be greatly increased. The deepest workings are 850 ft. from the surface on the dip, and at that level the flow of water is at the rate of 300 gals. per minute.

Los Muertos adjoins the Quebradillas to the north and is now worked through a main slope down 725 ft., located 150 ft. north of the main slope of the Quebradillas. This mine has the same ore-bodies as were noted in the Quebradillas, with the exception of the fourth vein recently discovered there. While the main slope is located near the south end of the property the drifts extend to the northern limits, where they connect with the workings of the Terrenates Mine, and thus secure excellent ventilation.

The ore is practically continuous on all of the veins, and some of the most important ore-bodies are encountered at the north end of the property. The output of this mine, per month, is 2,500 tons of ore, averaging 300 oz. of silver.

The *Terrenates* adjoins Los Muertos to the north, and is worked to a depth of 460 ft. This property was well opened on the footwall side of the vein, but no high-grade ore was ever developed until recently. This was due to a lack of cross-cutting to the hanging wall. Recently short cross-cuts have developed for, if the results are favorable, capital will be encouraged to invest in the score or more properties covering a distance of six miles on the line of the strike of the Veta Colorada, to the north.

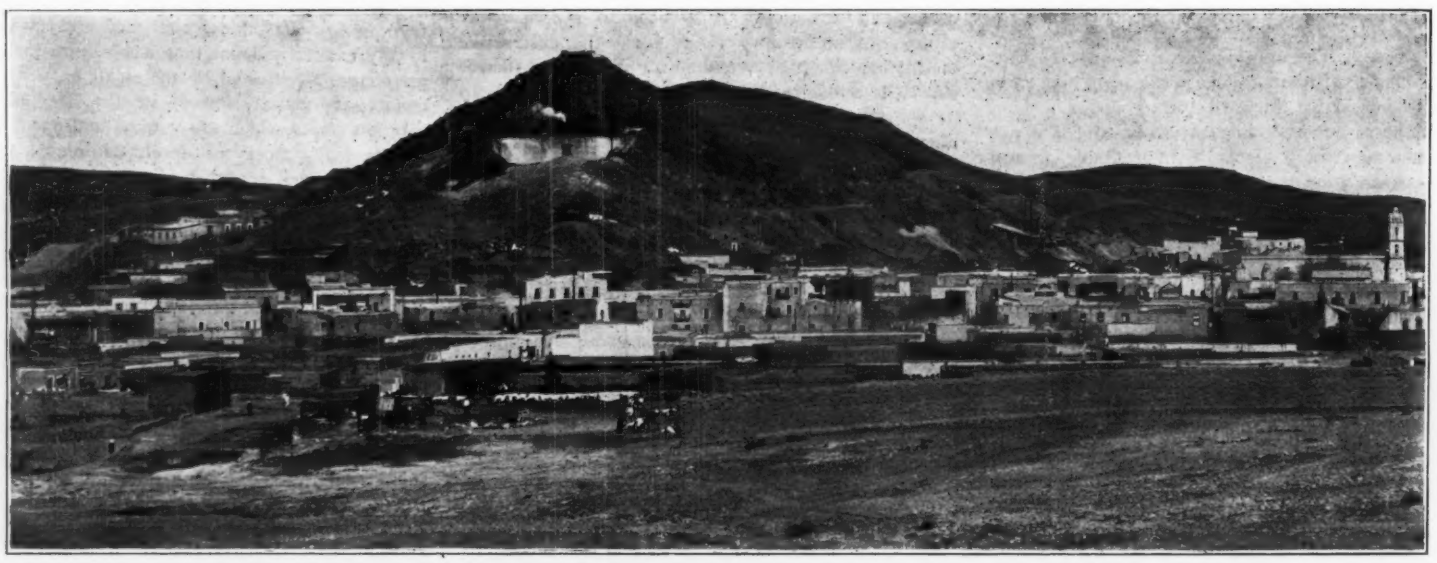
Los Remedios adjoins La Constancia to the north, on the Veta Colorada. It has a main slope, near the center of the property, equipped with steam hoist and down 425 ft., with drifts north and south at regular intervals. This mine is just starting up under new management, having been closed down for a period of about a year.

From the Morena Mine to the Los Remedios inclusive, the dip of the vein is quite uniformly 52° E., but from this point north the dip gradually flattens until at the Polo Norte, which is the most northerly property on the lode, the dip is 44° only.

To the north of Los Remedios no development work has been attempted, although in places the croppings show great thickness, but no assays of more than 15 oz. have been secured.

The general experience on the Veta Colorada has been that rich ore is seldom encountered until a depth of 300 ft. on the slope has been attained.

The facilities for transport in this part of the district are good, but as development proceeds northward additional facilities will be required. There is no better manner of proving that this district has



GENERAL VIEW OF PARRAL, MEXICO, AND NEIGHBORING MINES.

covered over a century ago, no profits worth noting were made until 1896. The ancient operators confined their work to the south end of the property, but since 1896 all the work has been confined to the northerly 100 meters. There are three shafts on this property, one at each extremity and in the center. From 1896 to August, 1902, there has been exported 62,306 metric tons of ore from this property from which were extracted 93,000 kilograms of pure silver worth $2,004,000 (Mexican), while the profit to the owner amounted to $1,157,000, which does not include profits of lessees. This shows an average assay value of 52.6 oz. per ton.

The lessees of this property pay royalties ranging from 25 per cent to 75 per cent of the extraction, the lowest royalties being paid on ores from below the water line, which is about 625 ft., on the dip of the vein, from the collar of the Santiago shaft. The main working slope is situated near the north end line. On account of the high royalties, only the better grades of ore can be handled by the lessees and large quantities carrying less than 30 oz. are left in the mine.

There are three well-defined veins in the upper workings, on one of which there is a chimney of pay-ore 60 ft. thick and 125 ft. long. At the 800-ft. level a fourth vein has been developed, which was previously not known. It is about 40 ft. from the hanging wall of the other veins, and shows a thickness of 4 ft., assaying 60 oz. Three thousand ore-bodies identical with those of Los Muertos, attaining a thickness of 15 ft. and assaying from 30 to 100 oz. The extensive development on the footwall side of the vein in this property have made the exploitation of this new ore-body easy and inexpensive.

The *San Antonio* adjoins the Terrenates to the north, and it is one of the historic mines of the camp. A new shaft, called the Santa Gertrudes, has been sunk to the 400-ft. level, at a point 650 ft. north of the old San Antonio shaft, which adjoins the south end line and is being continued indefinitely. The drifts from this shaft are being connected to the workings of the San Antonio and the Terrenates Mine.

Large bodies of 25 and 30 oz. silver ore have been developed and apparently an important shoot of ore assaying from 100 to 150 oz. has been encountered at a distance of 100 ft. south of the Santa Gertrudes shaft.

La Constancia adjoins the San Antonio to the north and, aside from old workings near the surface, has undergone no development. Drifts, however, are being extended northward into this property from the Santa Gertrudes shaft, and they have given encouraging results. A new slope is being sunk on this property at a point 700 ft. to the north of the Santa Gertrudes.

The surface showing on this property is excellent, and considerable interest is felt over the outcome, exceptionally low freight and treatment charges than by stating that one of the largest companies operating on the vein has found it expedient to shut down the lixiviation plants, and instead, to ship all the ore direct to the smelter.

TREATMENT OF SLIMES.

A new way of treating slimes by spraying has been developed by Joseph T. Terry, Jr., of San Francisco. After the sludge from a mill has been allowed to settle in reservoirs or tanks to remove the excess of water, it is sprayed by gravity into a cyanide solution instead of using the usual mechanical methods of agitation. The slimes are then allowed to settle, the clear solution is drawn off by decantation through vertical filters, and this solution, after extracting the values by passage through a zinc box, is then run into a vat, at a lower level. Into this lower vat, the sludge from the upper vat is similarly discharged by spraying with a duplication of the subsequent treatment as described above. These operations—of spraying, settling and decantation—are continued until the extraction is satisfactory. The final solution passes to a sump tank, to be standardized.

There are many ores in which the gold is in such a finely divided state that it is not amenable to amalgamation or concentration, and it is only by the cyanide process that it can be economically recovered. With such ores the argillaceous portion will carry a large portion of the values. In many cases this

gold is readily dissolved by a cyanide solution without long contact or agitation. Under such conditions this gravity system may be found serviceable.

Even when the ore requires long contact by agitation, this system of decantation might be found to facilitate the handling of large quantities of slimes and thus render unnecessary the use of great volumes of low-grade solution, from which it is difficult afterwards to obtain a satisfactory extraction of the metals.

GOLD MINING INVESTMENTS.*

By J. H. Curle.

The writer concludes a series of thirteen articles, on the above subject, in the *Economist*, by explaining the objections to buying into a mine which does not come up to a certain standard, and he points out the attendant risks, as follows:

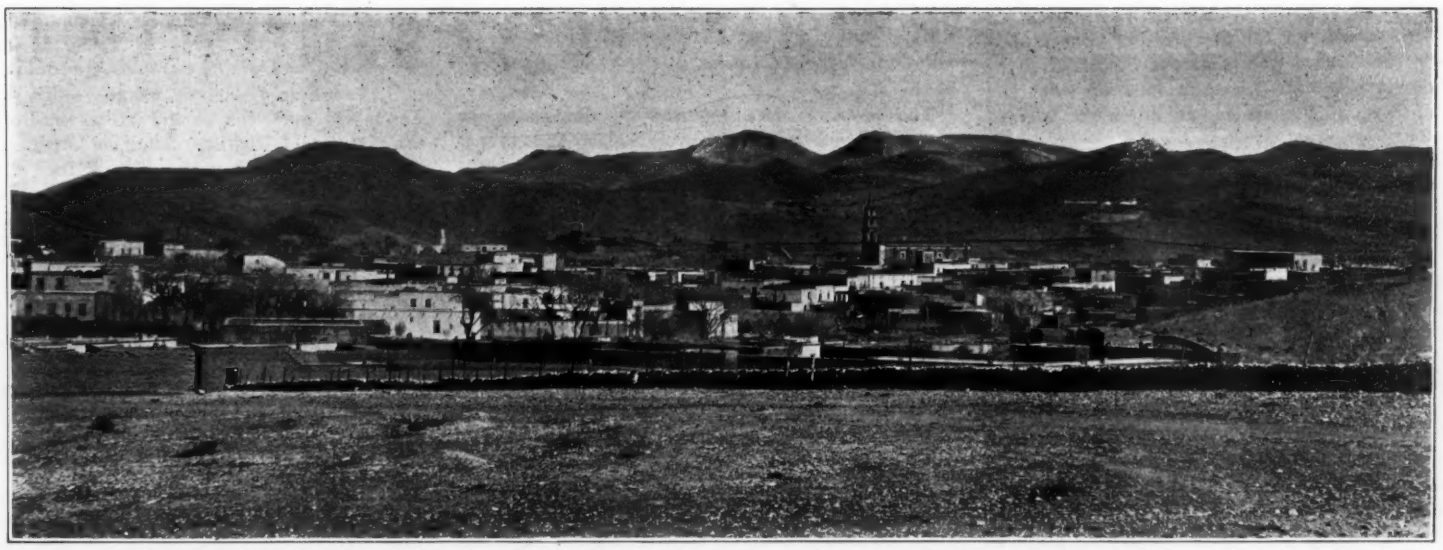
Firstly come what I may call the psychological reasons. People usually buy shares, not when the market is bad, but when it is good, or even when it is inflated. There is a general feeling of optimism in the air. One hears his friends remark that their shares are going up. What more natural than that he, having money to invest, should take that opportunity to purchase. He is thus often at a disadvantage from the beginning, for the market reaction is as natural as the returning swing of a pendulum. He sees his shares, even if he has selected the safest, fall perhaps 10 or 15 per cent, and, although his dividend comes in regularly, it may be a year or two before the shares again stand at the price he paid for them. In the meantime, for some reason impossible to have foreseen, he may require this capital for more urgent use elsewhere. But he can only realize it at a loss of perhaps 15 per cent. A dividend of 10 per cent, in the meanwhile, cannot compensate for this loss. It must be remembered, too, that very often the best shares intrinsically are the most stagnant on the Stock Exchange. Speculators have lost interest in them. It does not matter to them if the mine is making £1,000 a day; it pays dividends only perhaps twice a year, and for the rest of the time the market again relapses into stagnation. Investors are only human. It may be that this continual inaction month after month, while gambling shares all round them go up by leaps and bounds, gets on their nerves, and they at last decide to sell out their good, but stagnant, shares at no profit, or even at a small loss. I suppose under this head innumerable small tragedies happen in the course of the year.

And then, too, mining shares are subjected to all sorts of outside influences. The mine in question may be doing splendidly, and the shares be intrinsically worth more than their price, when suddenly there is rumor of a war, or news of a monarch's death, or a strike, and although this news may not affect the mine to the extent of a farthing, nevertheless, the shares fall sharply, and, it may be, do not recover for months. After that, a "bear" attack may be organized on the mine. Or there may be a reaction from over-gambling in the mines of some other country, affecting the whole mining market, and down come the wretched shares again!

Then there are troubles of a more actual sort at the mine itself. There may come drought, with a consequent scarcity of water. Take the case of Mount Morgan. Here is, perhaps, the greatest gold mine in the world, with twenty years' ore in sight. Two years ago the future seemed unclouded, and the shares were at £5. Then came the excessive drought. The mine could only work at half its capacity; the dividend was reduced more than one-half, and the shares fell to nearly 70s. Of course, such a fall was not justified; but in a nervous market, who is going to try and stop it? A greater trouble to mines is the labor question. A strike is bad enough, and has done great harm at times to mines in America and elsewhere, but a real lack of labor is more serious still. Look at the Rand to-day. There, if any place in the world, are real mining investments, and the best outcrop mines are as far removed from risk as mines can be. And yet we see those mines now working at barely half their capacity for lack of labor. The problem is still unsolved. And, meanwhile, the mines, as I showed last week, are depreciating in value to quite a serious extent. All these matters do not affect the value of the ore itself. But there is always the risk of that going wrong in depth. This is a subject too painful to picture. I shall only indicate it. The investor, besides having all these problems to face, is putting his money into a business in which there is a great deal of lying and deception. His money is too often entrusted to the care of directors who are incapable; they, again, are more or less at the mercy of a manager, who, if not a dishonest man, may often be mistaken in his opinions or even in his assays. I could continue to show many other points in which the investor is at a disadvantage. But I think I have already proved to him that his risks are many, and that he can only protect himself against these by securing a big return for his money. Ten per cent is really little enough. It will only suffice when supplemented by the big ore reserves we have stipulated for. Of course, he has points in his favor, too. I need not enlarge on these; the great optimism that is in us all where gold mines are concerned will do that for him. Have we not seen that, even with all their risks, most mines are overvalued?

But I must not end this in a gloomy mood. I have said that I think the gold-mining industry is gradually coming on to a sounder basis. I now repeat this. Only, let the would-be investor go cautiously.

* Abstract from the London *Economist* of February 28, 1903.



GENERAL VIEW OF PARRAL, MEXICO, AND NEIGHBORING MINES.

NOTES ON NICKEL-STEELS.

M. Guillaume, assistant director of the International Bureau of Weights and Measures, has been making for several years a special study of nickel-steels. He has found in the series of alloys of iron and nickel a curious anomaly, of which one of the characteristics is a considerable falling off in expansion as compared with that which the ordinary law of mixtures should give. He has succeeded, according to Henri de Parville, in the *Journal des Debats*, with the assistance of the Societe de Commentry Fourchambault, in obtaining alloys which contract when heated, a little after the manner of india rubber. It is a curious result from which many important applications can be drawn. For example, there can be obtained alloys with so little expansion, that it can scarcely be measured by the most delicate processes. A nickel-steel wire has been made which had an expasion of only 0.4 millimeter in a length of 1 kilometer, between 0° and 20° C. (0.0253 in. in a mile, between 32° and 68° F.).

The value of the new alloy for the compensation of chronometric apparatus and the measure of geodetic bases can be understood. In metrology the determination of variations in the length of the rods forms one of the great difficulties among the very difficult operations of geodesy.

M. Guillaume has also studied the changes which time produces in the alloys. The stability of the aloys is wholly sufficient for geodetic purposes and fo rthe construction of compensated clocks. The Swiss manufacturers are already making compensators on which temperature has almost no effect. These nickel-steels contain 36 per cent of nickel.

Certain alloys of different composition undergo curious changes when they are plunged into liquid air at a temperature of 180° below zero C. (292° below zero F.). A bar containing 30 per cent of nickel, when thus heated, became permanently lengthened under the influence of the cold, instead of being shortened. The material underwent profound changes, as crystallizations indicating a transformation of the metal were seen to form on the polished surfaces. These investigations are of both scientific and practical interest.

WIDTH OF FURNACE RELATIVE TO TONNAGE IN COPPER MATTE BLAST FURNACE PRACTICE.

By W. RANDOLPH VAN LIEW.

It would be a matter of great value to metallurgical practice if, instead of each manager, or superintendent, having his own particular notion as to the width to be given a blast furnace, it could be determined on a scientific basis what should be the width best adapted to secure the most economical costs, and, the largest tonnage smelted, per square foot of hearth area at the tuyeres.

I say tonnage smelted per square foot of hearth area at the tuyeres, as it is the only true standard by which to gauge, or compare, the workings of different types of furnaces. A furnace 15 ft. long, smelting 500 tons of material a day, could just as well be made 150 ft. long, and to smelt 5,000 tons per day. It is simply a question of spouts and settlers at regular intervals. Two furnaces may be run side by side, one smelting 700 tons, the other 400 tons, yet the latter may be doing half as much more work, as it all depends on the number of square feet of area the furnace has to smelt in at the tuyere zone.

Until recently, very little has been published concerning the tonnage treated by furnaces of different sizes situated in different localities. This has made it difficult for those either contemplating the erection of plants or the modification of existing furnaces, to form an idea of what the different types of furnaces can do in the way of capacity.

This spirit of secrecy, in the end, always operates against those who practise it. It seems to have characterized the metallurgy of copper more than that of any other metal. As an instance, I may mention the fire refining of copper, the art of which, until the past few years, was jealously guarded, and practically handed down from father to son. Again, in the province of the electrolytic refining of copper, until quite lately, the doors were closed to all, and this spirit even survives to-day in some Eastern refineries, in the face of their general operations, currents and strength of electrolyte, being within narrow limits known to most of the profession.

As an illustration of the extremes to which this spirit lends itself, it is but necessary to point to our English cousins, in the metallurgy of iron, where this same narrow spirit is exhibited, each company wrapping itself within its own walls, so that their representatives, coming to this country, look in open mouthed astonishment at the way in which the doors of our large steel plants are thrown open to them, and at the freedom with which our methods are explained to them, this very interchange of ideas, and improved practice among ourselves, no doubt being one of the principal factors in placing the United States in that foremost position which she holds in the steel industry to-day.

Fortunately, those engaged in the metallurgy of copper are, at last, following in the footsteps of our friends, the iron metallurgists. Among those who have taken up the cudgel in this respect, are Mr. William A. Heywood, of the Tennessee Copper Company, and Mr. Paul Johnson, of the Greenwood, British Columbia, Company, who, in recent issues of the ENGINEERING AND MINING JOURNAL have given interesting data, that afford a valuable study in widths of furnaces as related to their output. Why cannot each superintending metallurgist who may read these articles contribute his quota also to the fund of general experience, that, from the whole, we may all of us benefit, and, having considered the difference in different ores, decide, within approximate limits, on that width which would seem to give the best results?

As I have said, the length of a furnace is immaterial; as to width, the narrowest furnace, of the usual rectangular type, that I know is 35 ins. wide at the tuyeres; the widest is 56 ins., or 65 per cent wider. It was my privilege, while in charge of one of the large blast-furnace plants in Montana, to observe the workings of furnaces of different widths on the same ores, the one style 44 by 100 ins., the other 56 by 180 ins., and the result from every standpoint was in favor of the narrower furnace.

The 56-in. furnace was much higher from the tuyeres to the charging floor, but the burden on the tuyeres was kept as nearly as possible at the same height.

The 56-in. furnace was fed by charging cars, the 44-in. by charging wheelbarrows, dumped directly into the furnace. Slags were very nearly the same, 2 to 3 per cent more iron not uncommonly being given to the slags from the 56-in. furnace.

The slag contents in copper were also the same, and very low. The 44 by 100-in. furnace would average, month after month, 215 tons per 24 hours, not including coke.

The 56 by 180-in. furnaces, at two different Montana plants smelting Butte ores, smelted 400 to 500 tons per day, with an approximate average of 420 tons.

The 44 by 100 in. furnace had 30.5 sq. ft. of hearth area at the tuyeres, which gives 7.06 tons smelted per square foot of hearth.

The 56 by 180-in. furnace had 70 sq. ft. of area, which gives 6.0 tons smelted per square foot of hearth.

The 44-in. furnace required 19 oz. blast, the 56-in. furnace required 27 oz. blast and 10 per cent more total fuel to do the smelting, the slags in both cases running between 38 and 42 per cent silica, 18 and 21 per cent iron, 18 and 24 per cent lime, and 0.2 to 0.4 per cent copper.

The tonnage of a furnace is affected also by the amount of iron in the slag; up to a certain point the more iron the faster the furnace will smelt.

Mr. Heywood, of the Tennessee Copper Company, in an interesting and valuable article, contained in the ENGINEERING AND MINING JOURNAL of July 26, 1902, states that on Tennessee ores, which, if I am correctly informed, carry enough iron to offer the desired quantity for good, easy running slags, the average work of a 56 by 180-in. blast-furnace was 495 tons per day, or 7.07 tons smelted per square foot of hearth. For one month 561 tons were smelted per day, or 8.01 tons per square foot of hearth; for seven days the average output was 615 tons per day, or 8.8 tons per square foot of hearth, while the maximum tonnage for any one day was 657 tons, or 9.4 tons smelted per square foot of hearth area, the blast pressure varying from 20 to 40 ozs., while composition of the slags was not given.

Turning from the wide 56 and 44-in. furnaces, smelting Tennessee and Montana ores, we will see, by referring to an equally valuable article by Mr. Paul Johnson, of the Greenwood Smelter in British Columbia, contained in the ENGINEERING AND MINING JOURNAL of August 23, 1902, that we can form an idea of the work of a still narrower type of blast furnace.

The furnaces at Greenwood are only 42 ins. wide. The size of the furnace at the tuyeres is 42 by 150 ins., or 43.7 sq. ft. of hearth area. The daily tonnage of ore is given as 380.5 tons, or 8.7 tons per square foot of hearth area. The highest average tonnage treated during one month was 428.6 tons per day, or 9.8 tons per square foot of hearth, and the highest for a single day was 460 tons of ore, or 10.5 tons per square foot of hearth. The average slags are stated to contain 39.8 per cent silica, 23.6 per cent iron, 19.6 per cent lime and 0.321 per cent copper, when producing a 50.1 per cent matte and using a blast pressure of 14.15 oz.

We come now to a still narrower type, a furnace 35 ins. wide at the tuyeres. It was my privilege to operate such a furnace on Old Dominion ores, duplicating all the conditions that would be required of it under matte smelting and converter practice. The trial lasted five days, when the sulphides in the bins were used up and the furnace returned to black copper smelting.

The results are of interest as bearing on the subject of widths of furnaces. The furnace in question was 35 by 122 ins. at the tuyeres, that is, it had 29.68 sq. ft. of hearth area. Not including coke, and under its duplicated converter conditions, the tonnage was as follows:

	Total tons.	Tons per sq. ft. of hearth area.
First day	255.0	8.60
Second day	282.0	8.50
Third day	283.8	9.56
Fourth day	322.0	10.84
Fifth day	334.0	11.25

On the fourth and fifth days the furnace ran on 7 per cent coke, and was running faster, when changed back to black copper smelting, than two days before, when placed on 7 per cent fuel.

The slags made varied between 37 and 41 per cent silica, 25 and 29 per cent iron, 11 and 15 per cent lime, 9 and 14 per cent alumina.

The slags in copper ran from 0.20 to 0.30 per cent copper for 42 to 48 per cent matte; from 0.30 to 0.40 per cent copper for 48 to 53 per cent matte. The blast was kept at 21 oz.

While I appreciate that a campaign of five days does not possess the same value as one of many months, still the fact remains patent that even so short a trial will possess its value, as indicating the possibilities of the narrow type of furnace.

Of the four types of furnaces—the 56-in. on Tennessee ores, the 56 and 44-in. on Butte ores, the 42-in. on British Columbia ores, and the 35-in. on Old Dominion ores—the advantage seems overwhelmingly in favor of the two narrower types of furnaces, both from the standpoint of tonnage smelted per square foot of hearth area at the tuyeres, and of economy of power for blast pressure. In the matter of feeding, I have found but little difference between hand feeding and charging direct from barrows—if the workmen have been trained to place their charges where needed—but comparing either of these to charging by cars, my own experience duplicates that of Mr. Paul Johnson. While automatic charging from cars permits larger bin capacity, the location of bins farther from the furnaces, and a certain amount of labor saved, yet it can only be used by sacrificing other conditions, the maintenance of which to the metallurgist—and to the company—are more to be desired. It is poor metallurgical practice to use any manner of feeding that will increase the fuel demanded, and also choke the output of your furnace. These two things charging by cars unquestionably does, while considering the extra labor involved in maintaining the other conditions about the furnaces, there is not so much labor saved, on the whole, as the uninitiated believe. Figuring simply the labor cost per ton of ore, the advantage will be in favor of the mechanical feeding by cars, but placing against this saving the resultant interior condition of furnace, the extra coke, and the decreased tonnage per square foot of hearth area, the smelting costs will be higher with the car charging.

To add to this data, it would be of much value and interest to the profession, if the managers or superintendents of smelting plants, possessing the 40 and 50-in. width of blast furnace, would give us the possibilities of those types.

MAGNESITE IN HUNGARY.—Two ranges of hills situated in the Carpathian Mountains of Hungary, about 20 kms. apart, are said to contain pure magnesite. The first range comprises the deposits of Burda and Ratko. The mineral occurs in considerable thickness, sometimes reaching 80 m. and over. The second range is situated at Jolsva. The product of the first range is treated at the works of Mynstya, where there are twelve ovens for calcining the magnesite, while the product of the Jolsva mines is calcined at Kobanya, a suburb of Buda-Pesth.

METAL PRODUCTION OF COLORADO.

We are indebted to Mr. H. A. Lee, Commissioner of Mines of Colorado, for an advance statement of the production of the precious metals, lead, copper and zinc in that State during the year 1902. In the following table we give the quantities produced, from this statement, comparisons being made with the similar statement for 1901.

	1901.	1902.		Changes.	%
Gold .....oz.	1,339,112	1,379,638	I.	40,526	3.0
Silver .....oz.	18,492,563	15,941,703	D.	2,550,860	13.8
Copper .....lbs.	7,872,529	8,463,938	I.	591,409	7.5
Lead .....lbs.	148,111,020	106,303,374	D.	41,807,646	28.2
Zinc .....lbs.	26,843,731	52,582,510	I.	25,738,779	95.9

From this table it will be seen that while there was an increase of 3 per cent in gold, there was a considerable falling off in silver and lead. A fair gain in copper is shown and a very large increase in zinc, the latter being due to the extensive marketing of zinc ores from Leadville, Creede and some other points, together with the reduction of ores in the State.

In the following table we give the values as stated in the report. In this table gold is, of course, given at its fine gold values, while those of silver, copper, lead and zinc are calculated by Mr. Lee on the average New York prices as given in the JOURNAL:

	1901.	1902.		Changes.	%
Gold	$27,679,445	$28,517,117	I.	$837,672	3.0
Silver	10,901,366	8,315,192	D.	2,586,174	23.7
Copper	1,303,297	1,006,108	D.	297,189	22.8
Lead	6,419,132	4,325,485	D.	2,093,647	32.6
Zinc	1,095,224	2,544,994	I.	1,449,770	132.4
Totals	$47,398,464	$44,708,896	D.	$2,689,568	5.7

It will be seen that the decreases in value in the case of silver and lead were considerably greater than those in quantity, owing to changes in price, while the low price of copper resulted in a decrease in values, although there was an actual gain in the quantity produced.

Mr. Lee's statement gives the production by counties. From this we have selected the nine leading counties, each of which produced a value of over a million dollars. We have placed after several of the counties, in parenthesis, the name of the chief district which gives that county its greatest production.

Counties.	Gold. Value.	Silver. Ounces.	Copper. Pounds.	Lead. Pounds.	Zinc. Pounds.	Total. Values.
Teller (Cripple Creek)	$16,931,893	62,780	.....	6,547	.....	$16,964,905
Lake (Leadville)	1,203,924	5,641,857	2,611,167	39,450,178	47,637,490	8,367,988
Ouray	2,420,726	789,855	526,541	4,262,063	.....	3,068,727
San Miguel (Telluride)	2,007,656	1,056,640	454,790	4,296,849	.....	2,787,700
San Juan	1,524,226	838,102	3,012,283	7,699,883	.....	2,632,759
Pitkin (Aspen)	4,899	3,063,450	10,654	24,973,816	.....	2,620,245
Gilpin	1,551,035	303,638	765,516	497,366	.....	1,820,648
Clear Creek	930,481	1,279,050	473,754	3,282,270	317,705	1,802,881
Mineral (Creede)	112,838	1,923,973	.....	9,291,358	2,047,555	1,593,549

It will be seen that Teller County far exceeds any of the others in the amount of its production, this being due to the fact that the county includes the Cripple Creek District. Lake County, with the Leadville District, also makes an excellent showing, although its production was only about one-half of that of Teller County. It had a much more varied output, however, all the metals contributing to the total. The figures were considerably increased this year by the large quantity of zinc ore sold. Ouray County, San Miguel, with the Telluride District, San Juan County, and Pitkin County, with the Aspen District, also make excellent showings, while Gilpin and Clear Creek counties maintain their old-time production. Mineral County, including Creede, was, like the Leadville District, considerably helped by the heavy sales of zinc ores.

MINERAL PRODUCTION OF GREAT BRITAIN.

The preliminary return for 1902 prepared by the British Home Department from returns furnished by the inspectors of mines of Great Britain has been issued. This gives the results of the working of mines included under the Coal Mines Regulation Act—which applies to mines of coal, fire clay, stratified iron ore and shale—and the Metalliferous Mines Act, which includes all other mines. The return for the quarries is not yet completed. The accompanying table shows the output of minerals for the year from the two classes of mines named:

MINERAL PRODUCTION OF GREAT BRITAIN.

	1902. Metal mines.	1902. Coal mines.	1902. Total.	1901. Total.
Arsenic	2,425	.....	2,425	3,361
Arsen. Pyrites.	535	.....	535	2,578
Barytes	22,308	.....	22,308	26,413
Bauxite	9,047	.....	9,047	10,191
Chalk	8,666	.....	8,666	4,564
Chert & Flint.	2,929	.....	2,929	2,976
Clay & Shale..	95,963	161,053	257,016	244,974
Coal	.....	227,178,140	227,178,140	219,037,240
Copper Ore and Precipitate ..	6,762	.....	6,762	6,792
Fireclay	.....	2,966,310	2,966,310	2,834,997
Fluorspar	4,970	.....	4,970	4,164
Gold Ore	29,953	.....	29,953	16,374
Gypsum	170,196	.....	170,196	151,199
Igneous Rocks	93,664	.....	93,664	98,912
Iron Ore	1,700,624	7,224,635	8,925,259	8,520,951
Iron Pyrites ..	1,617	7,551	9,168	10,238
Lead Ore	23,615	.....	23,615	26,970
Limestone	571,721	33,346	605,067	539,873
Manganese Ore	1,278	.....	1,278	1,646
Ocher, Umber, etc.	7,666	.....	7,666	5,228
Oil Shale	.....	2,107,534	2,107,534	2,354,356
Petroleum	.....	25	25	8
Rock Salt	162,193	.....	162,193	151,348
Sand	13,075	.....	13,075	11,863
Sandstone and Ganister	201,760	95,914	297,674	321,858
Slate	159,540	.....	159,940	154,324
Tin Ore(dr's'd)	6,698	.....	6,698	6,542
Uranium Ore..	52	.....	52	79
Wolfram	9	.....	9	18
Zinc Ore.....	25,060	.....	25,062	23,752

In examining the statistics given in this table, it must be remembered that the figures do not in all cases represent the total production of minerals for the year. There are large quantities of some important minerals, such as iron ore, limestone, sandstone, slate and clay, which are obtained from open workings, falling under the Quarries Act, and these will furnish additions to the total. The figures given for coal, however, and for the ores of copper, tin, lead, zinc and gold, may be regarded as substantially complete. The output of coal, as shown in the table, was 227,178,140 tons in 1902, showing an increase of 8,140,900 tons over 1901. This increase was fairly well distributed over the different districts of the United Kingdom.

It will be seen that the total tonnage raised from the coal mines was 239,774,508 tons, and from the metal mines 3,322,326 tons, in both cases a considerable increase being shown over the previous year. The number of persons employed in the mines was as follows:

	—Coal Mines.— 1901.	1902	—Metal Mines.— 1901.	1902.
Underground	647,822	663,349	18,804	18,035
Above-ground	158,913	162,052	13,639	12,777
Total	806,735	825,401	32,443	30,812

It will be seen that the increase in the output was slightly greater in most cases than that in the number employed. Thus, the coal production showed a gain of 3.7 per cent, while the increase in the number of persons employed at the mines was only 2.3 per cent. In the metal mines the increase in work done was coupled with a decrease in the number employed.

BESSEMER STEEL PRODUCTION IN 1902.

The American Iron and Steel Association has collected complete statistics of the production of bessemer steel in the United States in 1902; and we give below its statement of the results shown:

Neither the production of bessemer ingots nor the production of bessemer rails kept pace in 1902 with the marvelous growth in that year of our iron and steel industries taken as a whole, which was owing entirely to the fact that the Lackawanna Iron & Steel Company dismantled its bessemer plants and its rail mills, as well as its remaining blast furnace, at Scranton, early in the year, preparatory to the erection at Buffalo by the Lackawanna Steel Company of new and more extensive works, which are not yet entirely completed. The North Works of the company at Scranton made their last rails on January 16, 1902, and the South Works made their last rails on February 26.

Ingots and Castings.—The total production of bessemer steel ingots and castings in 1902 was 9,306,471 gross tons, against 8,713,302 tons in 1901, an increase of 593,169 tons, or 6.8 per cent. The increase in 1901 over 1900 amounted to 2,028,532 tons, or over 30 per cent. The production of 1902 was the largest in our history. The following table gives the production of bessemer steel ingots and castings in the last six years. Of the production last year 10,466 tons were steel castings, against a production of 6,764 tons in 1901. The figures are in long tons:

1897	5,475,315	1900	6,684,770
1898	6,609,017	1901	8,713,302
1899	7,586,354	1902	9,306,471

Below we give by States the production of bessemer ingots and castings in the last two years:

	1901.	1902.		Changes.
Pennsylvania	4,293,439	4,379,516	I.	86,077
Ohio	2,154,846	2,528,802	I.	373,956
Illinois	1,324,217	1,443,614	I.	119,397
Other States	940,800	954,539	I.	13,739
Total	8,713,302	9,306,471	I.	593,169

There were no Clapp-Griffiths works in operation in 1902, and only two Robert-Bessemer plants were active. Five Tropenas plants were at work, as compared with seven in 1901. In addition one Bookwalter converter was running. All these works that were active were engaged in the production of steel castings only.

Rails.—The production of all kinds of bessemer steel rails by the producers of bessemer steel ingots in 1902 was 2,876,293 gross tons, against a similar production in 1901 of 2,836,273 tons, in 1900 of 2,361,921 tons, and in 1899 of 2,240,767 tons. The maximum production of bessemer steel rails by the producers of bessemer steel ingots was reached in 1902, but the increase in that year over 1901 amounted to only 40,020 tons, or 1.4 per cent. As compared with 1887, fifteen years ago, the increase in 1902 in the production of bessemer rails amounted to only 831,474 tons, or 40 per cent, while during the same period the increase in the production of bessemer ingots amounted to 6,370,438 tons, or almost 217 per cent. The following table shows the production by States of bessemer steel rails by the producers of bessemer steel ingots in the last two years. The figures do not include a small quantity of rails made each year from purchased blooms or from re-rolled steel rails, statistics for both of which products for 1902 are not yet available:

	1901.	1902.	Changes.
Pennsylvania	1,406,008	1,148,425	D. 257,583
Other States	1,430,265	1,727,868	I. 297,603
Total	2,836,273	2,876,293	I. 40,020

At the request of the manufacturers we separated for 1897, for the first time, the production of rails weighing 45 lbs. and less than 85 lbs. to the yard from those weighing less than 45 lbs. and over 85 lbs. to the yard. This separation we continue for 1902, as follows. Bessemer rails made from purchased ingots or from re-rolled rails are not included:

	Under 45 lbs. Gross tons.	45 and less than 85 lbs.	85 lbs. and over.	Total.
Pennsylvania	53,964	766,567	327,894	1,148,425
Other States	173,104	1,237,496	317,268	1,727,868
Total for 1902 ..	227,068	2,004,063	645,162	2,876,293
Total for 1901 ...	140,214	2,202,237	493,822	2,836,273
Total for 1900...	154,796	1,605,067	602,058	2,361,921

It will be noticed that there was a considerable decline in 1901 in the production of bessemer steel rails weighing 85 lbs. and over as compared with 1900, but that in 1902 there was an increase over 1900, and a very large increase over 1901. The production of rails weighing between 45 and 85 lbs. shows a slight decrease in 1902 as compared with 1901.

The total production of rails in 1902 will in-

clude rails made from open-hearth steel, rails rolled from purchased bessemer blooms, re-rolled rails and iron rails. The total from all these sources in 1901 amounted to 38,366 tons.

With the exception of the Lackawanna plant at Scranton all the bessemer rail mills were operated nearly to their full capacity in 1902, the demand for steel rails being greater than the supply all through the year. In addition to the large production of rails we imported last year 63,522 tons of iron and steel rails, but to balance this importation we exported 67,666 tons of iron and steel rails. In 1901 we exported 318,956 tons of rails and imported only 1,905 tons. Virtually all our imports and exports of rails are steel rails.

THE COPPER DEPOSITS OF BISBEE, ARIZONA.*

By F. L. RANSOME.

Situation.—The Warren mining district, in which occur the ore-bodies that have given Bisbee its prominence, lies in the central part of the Mule Mountains, a generally northwest-southeast range, about 30 miles in length, extending from the town of Tombstone to the Mexican border. In the vicinity of Bisbee the range attains an elevation of 7,400 ft., and has a width of about 12 miles.

Early History.—Prior to 1880, Bisbee was an unimportant lead camp, a single furnace being then in operation upon the cerussite mined from the Hendricks claim, close to town. The copper ore of the Copper Queen Mine was discovered early in this year, and was profitably exploited until 1884. This ore was free from sulphur and averaged 23 per cent copper. It was treated in two 36-in. furnaces, which, in spite of their small size and the use of wood as fuel, were able to turn out about 500,000 lbs. of copper per month. In 1882, the men composing the present Copper Queen Company bought the Atlanta claim near the original discovery, and began prospecting. In 1884, the Copper Queen orebody, which had been worked for 300 ft. down an incline, was exhausted. The outlook was gloomy and work was almost abandoned, when a second ore-body was simultaneously discovered from the original Copper Queen incline, and from the Atlanta workings. In order to avoid legal complications, the two companies combined as the Copper Queen Consolidated Mining Company, which gradually absorbed the neighboring properties by purchase. In 1886, the old smelting plant became inadequate and was rebuilt. Greater economy was necessary, as the average tenor of the ore had fallen to about 8 per cent and the price of copper had also notably declined.

Shortly after 1890 the completely oxidized ores showed signs of failing. But in 1893 the works were remodeled by the introduction of converters, and sulphide and oxide ores have since that time been successfully worked together by the matte process. The introduction of these converters was due to Dr. James Douglas, and it marked the beginning of a new epoch in the smelting of copper ores in Arizona.

Up to the end of 1902, practically all the copper from Bisbee was the product of the connected group of mines owned by the Copper Queen Company. Recently, however, extensive ore-bodies have been opened up in the Calumet & Arizona mine, and in the latter part of December, 1902, this company was turning out from 30 to 40 tons of copper per day from its new smelter at Douglas.

Production.—From August, 1880, to the end of 1902, the total output of the Copper Queen Company has been over 378,000,000 lbs. of copper. The product of all other mines within this period is probably something less than 2,000,000 lbs., so that the total production of the district may be given, in round numbers, as 380,000,000 lbs. The maximum output was in 1901, when the Copper Queen mines produced 39,781,333 lbs. of copper.

General Geological Features.—The principal bodies of copper ore all lie south of the town of Bisbee, within a radius of a mile. They occur in Carboniferous limestone, on the southwest side of a great fault, and closely associated with an intrusive mass of granite-porphyry. In the absence of a geological map and sections, the structural relations may perhaps be best presented by a homely illustration. If the half of a broken saucer be placed on the table with the fractured edge lying about W.N.W., and if the back of a book be laid against this edge we shall have a rough illustration of the geological structure near the town of Bisbee. The saucer represents the synclinal position of the Paleozoic beds, from the Upper Carboniferous limestone down to, and including, the Cambrian quartzite. The broken edge of the saucer is the great fault, while the book is pre-Cambrian schist, against which Upper Carboniferous limestone has been dropped by this fault, with a throw of more than 1,500 ft.

The town of Bisbee lies on the fault line. The hills northeast of the town are composed of pre-Cambrian schists. Those just south of it are Upper Carboniferous limestone, with Lower Carboniferous, Devonian and Cambrian beds coming successively to the surface along the fault to the northwest.

A little less than half a mile southeast of the center of town, the fault encounters a mass of altered granite-porphyry, and there apparently ends. This porphyry, which forms Sacramento Hill, a well-known local landmark, is a very irregular mass about a mile in diameter. It has invaded the pre-Cambrian schists on the northeast and the Upper Carboniferous (probably also the deeper lying Paleozoic beds) on the southwest. The available evidence indicates that the intrusion of this porphyry took place after the dislocation of the invaded rocks by the great fault. The latter probably continues to the southeast of the porphyry mass, but it is concealed in this direction by the younger Cretaceous beds. The Paleozoic series forming the faulted syncline are not merely bent, but are cut by many faults, some of them of considerable throw. These faults are, as far as seen, of the normal type.

Occurrence of the Ore.—The ore occurs very irregularly as large masses within the limestone. The horizontal extent of these bodies is usually much greater than the vertical. They are rudely tabular in form, and lie generally parallel to the bedding planes of the limestone. As a rule, the important ore-bodies have been found within a distance of 1,000 ft. of the main porphyry mass or of the great fault-fissure just northwest of the porphyry. In the Czar workings of the Copper Queen Mine, partly under the town, the ore extends from the surface to a depth of about 400 ft. In the Calumet & Arizona Mine, about 3,500 ft. to the south of the Czar, no large ore-bodies were encountered until the shaft had penetrated about 800 ft. below the level at which the first ore-body was discovered on the Copper Queen claim. The ore thus occurs at increasing depths toward the center of the local synclinal basin. Detailed structure-sections will probably show, however, that the upper limit of the ore increases in depth somewhat less rapidly than would be the case did it correspond to a definite stratigraphic horizon.

With the exception of the extreme western part of the Copper Queen Mine, all of the productive workings in the vicinity of Bisbee are in the Carboniferous limestones. It is probable that the greater part of the ore-bodies occur in the granular limestones of the Lower Carboniferous, but the distinction between Upper and Lower Carboniferous beds can rarely be satisfactorily made underground. Some important ore-bodies certainly occur in the lower part of the Upper Carboniferous. On the other hand, no ore-bodies of consequence have yet been found in the deeper-lying Devonian and Cambrian limestones. In the Copper Queen Mine, local usage has distinguished an "upper lime" and a "lower lime." As far as could be seen, however, this distinction is not based on lithological or structural features. The "lower lime" appears to be any limestone lying underneath the known ore-bodies. It is in the main Lower Carboniferous, and the ore-bearing possibility of the underlying and Devonian and Cambrian beds are yet unproved.

Although the ore-masses in general are what are generally termed "flat" ore-bodies, dipping gently with the enclosing beds, they are related to other structures as well as bedding planes. Ore is usually found in large masses along the contact of the limestones with the main porphyry mass. This contact, however, has not been thoroughly explored, and much of the ore along it consists largely of low-grade, partly oxidized pyrite. Dikes and sills of porphyry occur in the limestones at various distances from the main intrusive mass, and these are almost invariably associated with ore in the adjacent limestone. In some cases large ore-bodies followed for a long distance, along the general plane of the bedding, have been known to turn down almost vertically alongside a porphyry dike. Fissures in the lime-

COPPER QUEEN HOIST AND SMELTER, BISBEE, ARIZONA.

* A preliminary outline published by permission of the Director of the U. S. Geological Survey.

stones have also undoubtedly influenced the distribution of the ore.

While the main porphyry mass of Sacramento Hill is often heavily impregnated with pyrite it has not been shown to contain workable ore-bodies. It is possible that one or more of the oxidized ore-bodies in the Copper Queen Mine were formed by the mineralization of the granite porphyry, but this is a point which the present investigation has not yet determined. It is certain that many of the porphyry dikes encountered in the workings of the Copper Queen mines show no appreciable mineralization even when in contact with ore.

Mineralogical Character of the Ores.—The ores worked by the Copper Queen Company up to 1893 were oxidized, consisting chiefly of malachite, azurite, cuprite and native copper. In the upper levels the malachite and azurite occurred in beautiful incrustations and stalactites lining caves in the limestones. These "cave ores" have been exhausted, and although oxidized material is still abundant, it occurs generally in soft earthy masses, often containing cuprite and native copper, and usually associated with large amounts of limonite and kaolin. Native copper and crystalline cuprite are still abundant in the recently opened workings of the Calumet & Arizona Mine.

The original sulphide ore consists of pyrite mixed with chalcopyrite. This pyritic ore is sometimes directly in contact with oxidized ores, but it is not uncommon to find masses of chalcocite between the two. Bornite has been found in some of the ore-bodies, but arsenical or antimonial compounds of copper are absent, so far as known.

Origin of the Ores.—That the original ore-deposition was genetically connected with the intrusion of the granite porphyry is reasonably certain. The present unfinished investigation, however, has not yet established the details of this connection. As a whole, the ore-bodies may be classed as typical replacement deposits in limestone.

The ore-bodies that have thus far been exploited have resulted from the operation of later processes of concentration acting upon the original pyritic ores. The occurrence of the chalcocite is closely related to the general progress of oxidation and this mineral has plainly been formed by the action of descending solutions upon lean pyritic ores. It is probable that at least a part of the chalcopyrite is to be credited to the same agency. There is an observed connection between good ore and permeability to downward moving solutions. Such pyritic ore as proves profitable is soft and crumbling and usually shows upon close examination interstitial sooty material that is probably amorphous chalcocite.

The lower limit of oxidation of the ores is very irregular and is apparently uncontrolled by any constant ground water level. In the Calumet & Arizona Mine oxidized ore occurs at a depth of 1,000 ft., while residual masses of sulphide ore occur in the adjoining Copper Queen mines within 150 ft. of the surface. Masses of lean pyrite are sometimes enclosed in an envelope of high-grade chalcocite and oxidized ores.

Future of the District.—Although more or less mineralization occurs at many points in the Mule Mountains there is little to indicate that any deposits of copper ore will ever be found to approach in importance those already known and awaiting discovery in the faulted limestone syncline about Sacramento Hill. For over 20 years, the Copper Queen Mine has produced an average of over 16,000,000 lbs. of copper annually. Recently the Calumet & Arizona Company has begun energetic operations in ground almost surrounded by the property of the Copper Queen. Not only is there sufficient known ore in these mines to keep them in operation for many years to come, but there is no evidence that the bottom of the ore-bearing ground has been reached in any of these extensive workings. Moreover, the statement may be ventured, that the spectre of the "lower lime" has hitherto had an undue influence in restricting prospecting to horizontal planes. There is certainly a reasonable hope of finding ore-bodies in the Devonian and Cambrian limestones beneath the masses that have been so profitably worked in the overlying Carboniferous beds.

But more than this, it may be pointed out that less than half of the semi-circular mineralized zone about the porphyry mass of Sacramento Hill has been explored at all. Ore was first discovered at the surface on Queen Hill, at the northwest end of the zone. From this discovery developments have been pushed by underground exploration, often with little or no surface showing, to the south. There still remains, however, an extensive area of unknown but promising ground, lying just south of Sacramento Hill and extending eastward toward the southeastern continuation of the great fault, which is here concealed by the basal conglomerate of the Cretaceous series. This is the eastern half of the semi-circular mineralized girdle about the intrusive mass of porphyry. Its exploration calls for no greater outlay or boldness than is already displayed in other parts of the district with less assured hope of reward.

ELECTRIC CRANE AND COPPER CONVERTERS, BISBEE, ARIZONA.

THE HEARST MEMORIAL MINING BUILDING, UNIVERSITY OF CALIFORNIA.

By S. B. Christy.

The Hearst Memorial Mining Building for the University of California has been designed to meet the needs for instruction of students in mining and metallurgy, and in the investigation of problems connected with these arts. As separate buildings are provided for instruction in mathematics, chemistry, physics, mechanics, surveying, drafting, geology and mineralogy, it has been possible to design a building devoted exclusively to mining and metallurgy. The plans of the building were based on 20 years of experience with the actual needs of mining students on the Pacific Coast and with special reference to the mining and metallurgy of gold and silver and other useful metals. In order to incorporate the experience of other districts the architect, Mr. John Galen Howard, has visited all of the leading mining schools of the world, and the writer as head of the Mining Department, has made such an examination twice within the last ten years.

The extreme dimensions of the building are 181½ by 227½ ft. It has four floors, including a well drained and lighted basement. The general ground plan of the building is rectangular, very nearly a square, and it is constructed on the gridiron pattern with a Greek cross in the center making four interior courts or light wells. There is also an offset in the rear to contain the ore-crushing plant.

The basement contains the steam heating and ventilating apparatus, extensive and conveniently arranged storerooms for materials and supplies of all kinds; these are connected by means of tracks with three elevators so placed as to permit the ready distribution of these supplies from separate centers placed on each floor. It also contains four rooms, each 20 by 32 ft., devoted to lockers, lavatories and shower-baths for the students. There are also dwelling rooms for the janitor and caretaker. In the heart of the building is the mining laboratory proper, which reaches from the ground floor up to the roof of the building, and is 46 ft. wide and 118 ft. long. The end nearest the rear of the building will be fitted up as a machine shop for working metals. On the right and left will be wings like the arms of a Roman cross. The one on the right, covering an area of 40 by 60 ft., will be used as a forge room and storeroom for iron and steel. This room will be fitted up with down-draft forges of the latest improved type, and will be used for giving practical instruction in the hardening and tempering of steel, the sharpening of hand and machine drills and such general forge work as is likely to occur about a mine. The wing on the left, of similar dimensions, will be devoted to the storage and working of wood and timber, and will be fitted up with all the typical woodworking tools suitable either for the framing of mining timbers or for pattern making.

The main mining laboratory, in the interior of the building, will be covered for its entire length by a traveling electric crane capable of handling a load of from five to ten tons. Blocks of stone will be provided for the students to become familiar with the methods of rock drilling, single and double handed, and by machine drills. Provision will also be made for experimentation in this room with diamond drills, artesian drills and various types of hoisting and ventilating machines. The machine shop, forge room, and wood-working shop are all conveniently placed for access from the mining laboratory, and will also serve general needs for the construction of research appliances for the entire building. There is also a basement room, 61 by 39 ft., connected with the gold and silver mill on the floor above, and used in connection with it. There are entrances to the basement on three sides of the building ,and a driveway is provided by which heavy

trucks can drive right on to the floor of the mining laboratory and deliver all heavy and bulky machinery and supplies convenient to the storerooms and elevators.

The chief entrance, in the center of the south facade, opens into the Memorial Vestibule and Museum, a lofty room, measuring 40 by 88 ft., rising through three stories, and surrounded by balconies at the level of the second and third floors. Light will come from three arched windows, 17 ft. broad by 28 ft. high, on the southern side, and from three circular domes, 50 ft. from the floor. The room will be paved with marble and finished in buff pressed brick. This museum is intended to illustrate all phases of mining and metallurgy, and will contain plans and models of machinery, and specimens illustrating the various stages of metallurgical processes from the raw material to the finished product. As it develops it will in time grow to be a very important educational influence.

To the right of the museum will be a large lecture room 40 by 42 ft., and to the left, offices for consultation, the preservation of records and reception and committee rooms. Opposite the main entrance to the museum will be a gallery leading to the first floor of the mining laboratory and arranged so that visitors can inspect the work going on without interfering with the operations. In the rear of the lecture rooms are the assaying laboratories, containing seven rooms in all, and covering an area 117 ft. by 38 ft. 2¾ ins. These rooms are devoted to the preliminary examination, crushing and preparation of assay samples, the weighing of the ores and the fluxing of the samples. The rooms are to be fitted with assay furnaces. One of the rooms will be provided exclusively with furnaces designed for the use of coke or charcoal as the fuel, while others will contain furnaces designed to burn soft coal. Separate rooms are provided for the parting of gold and silver and for the weighing of assay buttons. There is an office for the instructor, and a storeroom for assaying supplies is arranged convenient to one of the elevators connected with the basement. Directly on the opposite side of the building is a suite of rooms covering a similar area devoted to experimental work in the treatment of gold and silver ores by roasting, chlorination, hyposulphite leaching and the cyanide process. Connected in the rear of the latter rooms is the gold and silver mill, 40 by 61 ft. This will contain stamp batteries and other crushing machinery for crushing gold and silver ores; spitzkasten, spitzlutten, vanners, jigs and other varieties of concentrating machines.

To the rear of the assaying laboratory on this floor is the lead and copper smelting room. This comprises a ground area of 40 by 61 ft., and will contain reverberatory furnaces for roasting and reverberatory and blast furnaces for smelting lead and copper ores. This room reaches to the roof of the building so as to secure good ventilation. Between the gold and silver mill and the lead and copper smelting room, and connecting them, is the dry crushing and sampling tower. It covers a ground area of 50 ft. square, and is three stories high. This is intended to contain all the machinery and appliances necessary for the dry crushing and sampling of ores. It will be provided with conveniences for illustrating the most modern methods for accurately sampling ores. In order to secure ample light and ventilation the tower projects about 36 ft. beyond the rear of the building, and is conveniently arranged with reference to the elevators and the gold and silver mill on the one hand, and the lead and copper smelting works on the other, so that it is easy to distribute the crushed ore anywhere it is intended to go.

The second floor, in addition to the galleries of the museum, will contain lecture rooms and studies. Directly over the assay laboratory will be a suite of rooms of similar dimensions to the latter devoted to advanced work and investigations by advanced students. On the other side of the building will be a similar suite of rooms devoted to special investigations and research work. These laboratories will be fitted up with all necessary appliances for the investigation of questions arising in the treatment of ores and metallurgical products. They will be supplied with gas, steam, compressed air and electricity, with convenient desks and working tables and evaporating hoods. While the beginners in the assay laboratory on the floor below will be confined to the use of coke, charcoal and soft coal as a fuel for their furnaces until they become thoroughly familiar with their use, the advanced students will be provided with gas and gasoline furnaces for the production of high temperatures in furnaces of various types, both for purposes of assaying and for high temperature investigations generally. The subject of electrolysis both in the wet way and by fusion in the electric furnace will receive particular attention, and every facility will be provided for the investigation of problems of this nature. The laboratories on this floor will be connected with the main gallery of the mining laboratory, and through it with the galleries in the gold and silver mill and smelting works and with the dry crushing tower so that the work of these departments may be cooperative.

The third floor will contain a stack room for the department library of mining and metallurgy, 40 by 42 ft.; and the gallery to the museum on this floor, giving convenient access to the stack room, will be reserved as a reading and study room for the mining students. On this floor on the right flank of the building will be a suite of rooms 40 by 100 ft., and well lighted, to be used as drafting, designing and reading rooms for advanced students. On the left flank of the building will be a suite of rooms of similar dimensions which will be devoted to photographic and blue print work, and with convenient rooms for the instruction of mining students in these arts.

In planning the building every effort has been made to concentrate those divisions of the work requiring quiet, such as lecture rooms, museums, reading rooms, etc., toward the front of the building, while those requiring the greatest amount of power and accompanied with noise, dust and corrosive fumes are concentrated toward the rear of the building. All the work under the immediate supervision of one person has been concentrated so far as possible upon a single floor. Each division and suite of rooms is arranged to be at once independent of the others, and at the same time, when necessary, accessible to them. The nearly square ground plan of the building was chosen as bringing the extreme departments as close together as possible consistent with the needs of light and ventilation. The building is believed to be adequate to the needs of the department for many years to come. It is so planned, however, that it can be indefintely enlarged without sacrificing its symmetry and beauty, and ground space has been reserved so that the area of the building can be doubled if necessity requires. The most convenient arrangement of the interior rooms for the present needs has been carefully studied in detail, but in order to provide for unforeseen needs that may arise in the future, the greatest elasticity marks the interior plans. The framework of the building being of steel the floors are arranged so to be wholly independent of the interior partition walls which, as now ararnged, contain flues for furnaces, hoods, heating and ventilation. But, should future necessity require a redistribution of space, this can always be effected with the minimum of inconvenience and cost.

The exterior of the building will be of granite from the Raymond Quarry in California, a stone of great beauty and strength. The interior of the laboratories will be finished in buff pressed brick.

"The exterior treatment," to quote Mr. Howard's own words, "is of an extremely simple, dignified character, based upon the classic tradition, but strongly influenced by the naif and charming work of the Spanish fathers in this land, and like that work depending largely for its effect upon the careful proportioning of its voids and solids and upon its low roofs of heavy terra cotta tile overhanging broad unornamented surfaces of wall."

A TEST FOR CYANIDE SOLUTIONS.*

By Albert Arents.

This test is based upon the fact that metallic copper will precipitate gold and silver upon its surface from acid solutions. Of course, the fact is not new, but its application is probably so. I have used the method with success; it recommends itself by the rapidity and ease with which it may be carried out.

An auriferous cyanide solution, if made acid with sulphuric acid and boiled with finely divided, pulverulent, metallic copper, will, within a short time, deposit its gold content on the copper. Any silver in the solution is also precipitated. If this mixture is now filtered, the filter and contents may at once be subjected to a crucible assay treatment, and its lead buttons cupelled and determined.

If, instead of taking cement-copper, or any metallic copper powder, a solution of bluestone is used after acidification, and a few small pieces of sheet aluminum are added, and the solution boiled until all the copper has come down, the result as to the precipitation of gold and silver is the same. This modification takes more time and attention in boiling. If aluminum has been used, it should go into the crucible with the filter and its contents. Commercial cement-copper is particularly fitted for this test, because the acid, in taking up any basic iron or copper salts of the cement copper, renders the copper as finely divided as it is customary to obtain it in the sluice-boxes of copper leachers. The finer and the more pulverulent the copper is, the greater is its surface and the more energetic the precipitation, thus permitting a minimum amount of copper to be used.

In applying the method, I use, as a rule, 250 c.c. of the solution to be tested; add a few c.c. of sulphuric acid; agitate for several seconds, and then add not less (although not much more) than one gram of cement copper. Now follows heating to boiling. This is kept up for about 10 minutes, so that the rising steam bubbles keep the mixture well agitated. The mixture is then filtered through a 7-in. diameter gray filter paper. No washing is done. As soon as the filtering is finished, one-third of a crucible charge of flux is added to the filter containing all the sediment of the mixture. Some of the moisture is rapidly absorbed by the flux, which permits the folding of the filter's rim upon the charge and its subsequent removal without loss or tearing. One-third of a crucible charge of flux having previously been placed upon the bottom of the crucible which is to be used for melting, the filter is transferred to the crucible, well tucked down, and the last one-third of the crucible charge is placed on top of the filter in the crucible. It is then ready for the furnace. The filter itself furnishes the reducing agent for the assay. I use 30 grams litharge and the usual amount of borax and soda, employing a No. F crucible for melting. About 20 grams of lead are obtained. The lead button comes out bright and clean, and upon cupelling furnishes a bead free from copper.

Possibly this method of testing for gold and silver may be used upon other solutions than cyanide; also, for solutions from testing metallic coper for precious metals, when the solutions do not contain nitric acid in any form.

* A paper read at the Albany meeting of the American Institute of Mining Engineers.

POPULAR SCIENCE.—The London *Engineer*, in a recent issue, refers to some amusing things, which appear in the columns of the daily newspapers in engineering matters. As an example it quotes from a description of a recent competitive trial of British naval vessels, one fitted with the old-style marine boilers and one with Belleville boilers. In this case the machinery of the boat carrying the Belleville boilers broke down, and the London correspondent of the Manchester *Guardian*—an important paper—gives his views as follows: "Indirectly, of course, the Belleville boilers were responsible for overheating in any part of the machinery, but that

in itself is not an argument for abandoning Belleville boilers, but for making your machinery match your boilers; in other words, for making it capable of resisting the driving power of such boilers. That the driving power of a Belleville is greater than that of a cylindrical boiler is, of course, not disputed."

AN IMPROVED FORM OF MINE WINDLASS.*

By G. Percy Ashmore.

The defects of the ordinary mining windlass are very evident. If one bucket is used, its weight is unbalanced; this dead weight may be from one-seventh to one-sixth of that of the load, and is consequently far from being a negligible quantity. The double windlass, with two buckets or kibbles, is free from objection as far as the balancing of the weight of the receptacle is concerned; but, for a given length and a given diameter of drum the depth to which winding can be carried on is limited, because the rope in coiling up can only travel one length of the drum, no overlapping being possible. The greatest depth attainable is therefore equal to the length of the total number of coils which can be wound on the drum. Thus, with a drum 8 ins. diameter, 6 ft. long and rope 1 in. diameter, the greatest depth attainable would be 150 ft.

This limitation of depth is not very important for shallow workings up to 120 ft., but in out-of-the-way places where labor is cheap, the windlass is often used for hoisting from depths of 300 or even 600 ft. If the ordinary form of double windlass is employed we therefore require a drum of larger diameter, a very long drum or a thin rope.

The diameter of the drum cannot be increased without diminishing the proportion between the leverage of the arm and that of the load. The second alternative, the use of a longer drum, makes it necessary to sink a longer shaft which means increased cost. The third alternative is easily possible, as a thin wire rope may be substituted for the thick hempen one. However, even with a hempen rope this difficulty of winding to a considerable depth may be overcome by dividing the drum into two halves by a collar in the middle, or by a series of pegs; each half of the drum is then supplied with a separate rope which can be wound up so as to overlap. It is true that with each successive series of coils the leverage of the load increases, but this increase is to a certain extent counterbalanced by the greater length of free rope hanging down from the other side of the drum. Another defect is that when once the rope begins to overlap it tends to mount on to the coil just wound, and then slips back into its position on the drum. The friction between the portions of the rope caused in this manner is the main source of the wear of the rope.

A satisfactory method of overcoming the difficulty of winding to a considerable depth with a hempen rope in a small shaft is to use the improved form of windlass shown in Fig. 1. The rope only makes one-half turn round the drum, and is prevented from slipping by means of 12 M-shaped pieces of ⅝-in. round iron, placed symmetrically round the center of the drum (Figs. 2 and 3). The angle of the M in which the rope lies is approximately 35°. The rope never touches the wooden portion of the drum, but jams in the angle of the M pieces, and so is prevented from slipping. Even if one end of the rope is hanging loosely down the shaft, and a full bucket attached to the other end, the friction is great enough to prevent any slipping.

The simple device just explained has the following advantages:

1. The bucket travels in the middle of the shaft, and it is therefore possible to wind from a great depth even in a small shaft.

2. Increased life of rope, for the main source of wear, friction between successive coils of the rope, is avoided.

3. Smaller quantity of rope required.

The following points with reference to the use of windlasses are not unworthy of attention (1) While the ordinary method of fixing the upright pieces which support the drum, as shown in Fig. 4, is good enough for a windlass definitely fixed in one place, the method indicated in Fig. 5 is better if the windlass has to be shifted frequently. (2) A metal bearing for the axle may easily be made by screwing a plate of iron or steel on to each upright (Fig. 6). (3) Leathern buckets (or *capachos*) are better than wooden ones as they last longer. They are best made from the green hides of young bullocks. For hauling water the hide is cut round, and a leathern lace run around the edge. The lace serves not only to draw in the mouth of the capacho but also to attach it to the hook.

If stone has to be wound the *capacho* is made rectangular, in sections (Fig. 9). The hair part of the rawhide is placed outwards, and the sides are laced up.

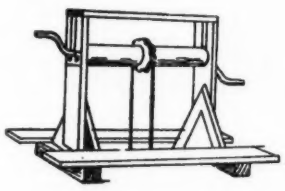


Fig. 1.

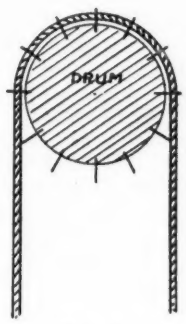


Fig. 2.

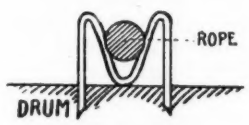


Fig. 3.

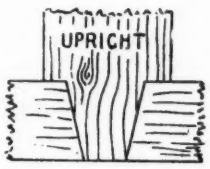


Fig. 4.

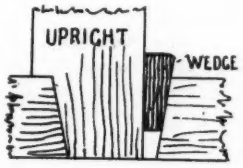


Fig. 5.

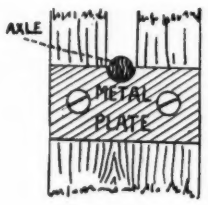


Fig. 6.

Fig. 7.

Water capacho, empty, lying flat

Fig. 8.

Water capacho full.,

Fig. 9.

IMPROVED FORM OF MINE WINDLASS.

* Paper read before the Institution of Mining and Metallurgy, London, February 19th.

THE HIGHLAND RANGE IN MINNESOTA.

By A. H. Elftman.

The Highland Range of hills extends from the eastern part of St. Louis County, Minn., northeastward, and follows a course about 10 miles inland, parallel to the general course of the north shore of Lake Superior. It varies in altitude from 1,000 to 1,200 ft. above the lake. The Sawteeth Mountains lie between the Highland Range and Lake Superior. Owing to the reported discovery of iron ore in quantity near Highland, on the Duluth & Iron Range Railroad, considerable interest is at present centered upon this range. Mining leases have been taken by the hundred upon ground covered with 3 ft. of snow. During the past ten years the writer has had occasion to examine the entire range, and described the general geology of the region in the *American Geologist* for 1898.

The greater part of the Highland Range is covered with a heavy deposit of glacial drift, in places having a depth of 200 ft. The Highland moraine follows chiefly along the summit of the range, and, with its numerous kettles, potholes and hillocks, forms a conspicuous feature in the topography of the region. Stratified gravels and debris are abundant immediately north of the moraine. The general direction of the glacial movement in this section was westward and northward from Lake Superior. The glaciers covering the Vermilion and Mesabi ranges did not over-run the Highland Range. The drift of the Highland moraine is composed of rocks from the east and northeast, and is destitute of jasper and iron boulders derived from the two iron ranges in Minnesota. In the numerous swamps and around some of the bogs and lakes are some springs which have accumulated local limited deposits of bog iron. Rock outcrops are relatively scarce, but there are enough of them along the range to show the nature of the underlying rock formations. These belong to the Keweenawan or copper-bearing rocks, and are locally designated as trap rock. Every member of the Keweenawan series north of Lake Superior is represented on this range. The lowest member of the series is the great gabbro mass, which contains the titaniferous magnetites of Minnesota. These magnetite deposits seem to be of greater extent near the contact of the gabbro with other formations. North of Duluth and eastward on the range are various localities where these iron ores are found. The gabbro, now regarded as a deep-seated basic intrusive rock, is generally of a coarse granitic texture, being called a granite, or "bastard granite," by the prospector or timber cruiser. Frequently, portions of the gabbro are fine grained norites, and are then called quartzite by the prospector. The complex red rock formation is found in all parts of the range. These rocks, so-called from their predominating color, consist of granite, syenite, quartz porphyry, various porphyrites and some basic rocks. Parts of the formation are black in color, and frequently resemble the black slates to the north. Some geologists regard the red rock as originally part of the Archean and Huronian of the Vermilion and Mesabi iron ranges, but separated from them by the gabbro intrusion from below. Being involved with the Keweenawan rocks and subjected to intense heat, they were completely changed from their original condition, and are now considered part of the Keweenawan series. If they are part of the older rocks, then there is a remote chance of stumbling on to a deposit of iron within their limit. East of the red rock is found the Beaver Bay formation, representing that part of the gabbro which reached the surface as lava flows. These consist chiefly of massive flows of coarse diabase and olivine gabbro. Above those are numerous thinner flows of diabase, diabase porphyrite and amygdaloids. Some of the eruptive rocks are separated by strata of volcanic ash and standstone. In the Sawteeth Mountains and at the lake shore the diabases contain the masses of

anorthosite which, on account of their high alumina content, were the cause of the local "corundum" boom several years ago. Frequently the diabases contain as high as 40 per cent iron under conditions similar to those found in the gabbro. This iron occurs as titaniferous magnetite and in the ferro-magnesian silicates. There is a strong local magnetic attraction in the region, and in many areas the compass cannot be used.

The amygdaloids, diabases and sedimentaries of the Temperance River formation, in small unimportant areas, extend to the Highland Range. Later than all of the preceding formations are large dikes of black, fine-grained diabase, locally called "black slate."

The geological conditions on the Highland Range are unfavorable to the finding of iron deposits similar to those on the Mesabi and Vermilion ranges. Prospectors, by assuming that the rocks are quartzite, black slate, taconite, greenstone, etc., enthuse their imagination in the belief that the geological formation and mineral conditions are identical with those of the northern ranges.

PLATINUM IN RUSSIA.

Our special correspondent reports the production of platinum in Russia in the year 1902 as follows, in poods: Societé du Platine, of Paris, 159; Count P. P. Schouvaloff, 99; Prince Demidoff, 53; Kolli, 40; small exploitations, 15; offered in the market, 80; total, 446 poods; equal to 7,306 kilograms. The metal "offered in the market" was really stolen, or obtained by unauthorized workers. All of this platinum was produced in the Ural.

Only a small part of this metal is used in Russia. Nearly all of it is exported at once to London or to Hanau, Germany, where it is refined.

A STRANGE OUTFIT FOR A PROSPECTOR.

The following description, taken from the *West Australian Mining, Building and Engineering Journal*, illustrates very forcibly that the equipment of a prospector must be made to suit local conditions and, in consequence, there may be a striking difference between the requirements of widely separated regions. It is only necessary to explain that there are several thousand camels employed in the interior of West Australia, which have largely been imported from Afghanistan; the Afghans naturally make the best drivers and understand them better than those who are unused to camel transport. The aborigines of Australia—the "blackboys"—know where water is to be found, in small cup-shaped depressions in the rocks. The natives call these *gnamma* holes, and the writer of these lines knows well enough from experience how necessary it is to know where these life-saving supplies are to be found amid wide stretches of desert land.

Our contemporary, referred to above, says: "A tin dish, water bag, and pick and shovel may be described as the old-time outfit of the alluvialist or digger as known in the East. The plant of a prospector who wishes to strike new country here will run into several hundreds of pounds cash, if he is to be properly equipped for a several months' trip. It varies according to the number of the party. Good camels are costly at the outset, but very soon repay the outlay, for the cost of water in dry country is considerable when it has to be carried, or time wasted in seeking it. Then, again, camels will live on herbage and trees horses don't care for. The other impedimenta are just as the fancy of the principals lead them. An Afghan is not always requisite, but it is just as well to have him. Success depends not so much on the speed of traveling as thoroughness and care in observing the country traversed. Many men make for records rather than doing the job well. An intelligent 'blackboy' is just as necessary as the camel driver. He will find gnamma holes, and attend to little matters which the white man either has not the inclination or the will to do properly. Load up only what is absolutely required. Take not one compass, but several, for it is easy for the needle to lie. A bicycle would come in handy at times, and on a pinch a hurried trip to a settlement could be made, instead of on foot."

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DEED TO MINING PROPERTY MAY BE "ESCROWED" SUBJECT TO ORGANIZATION OF CORPORATION.—A deed executed and recorded by the owners of a mining claim, naming as the grantees a corporation then contemplated, and actually organized a few days afterwards, and placed in the hands of a promoter of the corporation to be delivered to it when it should be fully organized, and afterwards delivered to it by the promoter, is valid and effectual to pass the title from the time of such delivery. The placing of such a deed in the hands of the promoter with instructions to deliver it when such corporation was formed did not of itself constitute delivery.—Soutaquin Mining Company v. High-Roller Mining Company (71 *Pacific Reporter*, 77); Supreme Court of Utah.

MEASURE OF DAMAGES FOR REMOVING TIMBER FROM PUBLIC MINERAL LANDS.—One who cut and removed timber from public mineral lands, which he converted into lumber and sold for the purposes permitted by law (Act June 3, 1878, U. S. *Compiled Statutes*, 1901, page 1528), is not liable as a willful trespasser for the added value of the timber due to his labor and expense, merely because of his failure to keep the record required by the rules prescribed by the general land office pursuant to such law, if he believed in good faith that he was a resident of the State in such sense as to be within the terms of the law, and where his failure to keep the record was due to his ignorance that it was required.—Powers v. United States (119 *Federal Reporter*, 562); United States Circuit Court of Appeals, Sixth Circuit.

MINING CLAIMS MUST BE VALUABLE AND WORKED TO PREVAIL OVER TOWNSITES.—The law of the United States confers on the locator of a mining claim a possessory title, but requires such locator to do a certain amount of work each year. The law of the United States also subjects townsite titles to whatever possessory right in the locator is recognized by the local authority, as does also the law of California. The law of the United States authorizes townsite lands to be conveyed to occupants and the balance sold or otherwise disposed of. It was held, the intent of the Federal law was merely to confer on mining titles acquired from the United States the same superior quality given by other sections of the Federal law to those recognized by local authority—that is, to any valid mining claim or possession held under existing laws, and this must be taken to refer to the possessory title and not to any mine subject to a valid claim or possession; and hence, locators whose claim had been patented as a townsite, and who afterwards failed to do the work required by law thereby lost their paramount title. Also that the law should be as applicable to a valuable mine and not to a mere worthless claim.—Callahan v. James (71 *Pacific Reporter*, 104); Supreme Court of California.

RIGHTS OF LOCATOR OF TUNNEL SITE WHO DOES NOT FILE ADVERSE CLAIMS.—Certificates of location of mining claims are not conclusive evidence of the facts which they recite against parties who claim the land they describe adversely to their makers. The judgments of the land department permitting entries of lands and the patents based upon those entries bind all the parties to the proceedings which resulted in them, and all those claiming interests acquired from such parties subsequent to the entries; but they do not prevent those who were not required to be parties to the proceedings from establishing by the customary evidence the truth relative to any fact material to their claims in any litigation between them and the holders under the patents. Entries and patents of lode mining claims in proceedings to which a claimant of a tunnel site, located across them prior to the entries, was not required to be a party, will not estop him from establishing by the testimony of witness who know, and by other customary evidence, the fact that no discoveries of lodes or mines of mineral had been made in the lode claims before the claim for the tunnel site was located across them. Patents of lode mining claims based on entries after the location of a claim for a tunnel site across them are subject to the rights of the claimant of the tunnel site in cases in which his rights therein were so uncertain, contingent and intangible that they could not be fairly litigated when the application for the patents were made, and sections 2325, 2326 of the Revised Statutes of the United States do not, under such conditions, require him to file adverse claims when applications for lode claims are made.—Uinta Tunnel, Mining and Transportation Company v. Creede & Cripple Creek Mining and Milling Company (119 *Federal Reporter*, 164); United States Circuit Court of Appeals, Eighth Circuit.

CONSTRUCTION OF MINING CONTRACT AS TO RECEIPTS AND EXPENSES.—A contract between four persons, each having a one-fourth interest in a lease of a mine, provided that in consideration of W. & F. the defendants in the suit, assuming and agreeing to pay all the expenses of the lease after January 25, C. & J., the plaintiffs, assigned to W. & F. each a one-eighth interest in the lease, and W. & F. agreed to pay all such expenses, it being the intention that the interests of C. & J. after such date should be each a one-eighth interest in the lease, and a like interest in the profits arising from the operation of the mine, without personal liability for any of the operating expenses; and the interests of W. & F. being each a three-eighths interest in the lease and a like interest in the profits, and each of the latter to be liable for one-half of the expenses, if any, over and above the earnings of the lease, and that the profits of the lease are to be computed and divided as follows: When on the last day of the month the total receipts from the lease, after said date, shall exceed the total of the expenses after said date to said last day of the month, the surplus of the receipts shall be divided, but at no time when such receipts do not exceed such expenses shall any division be made, it was held, that a division of the profits is not to be made any month without regard to prior months, but only when deducting from the total receipts from January 25, the total expenses from said date, there is a profit. Also, that where parties have acquiesced in such a construction for months, they cannot after work has ceased claim the contrary—that the divisions of profits is to be made on the basis of the monthly receipts and expenditures, and justify their silence on the ground that they feared that if they objected the work would cease. The receipts out of which profits are to be paid are only such part of the receipts as by the original lease belong to the lessees, and therefore do not include royalties reserved to the lessor.—Taylor v. Thomas (71 *Pacific Reporter*, 381); Supreme Court of Colorado.

ABSTRACTS OF OFFICIAL REPORTS.

Borax Consolidated, Limited.

This is a so-called international combination, having a capitalization of £1,400,000 ($7,000,000), and owning borax mines and refineries in the United States (in California and New Jersey), England, France, Austria, Turkey and South America.

On September 30, 1902, the mines, equipment and railways, together with the good-will of the company, were valued at £2,220,124 ($11,100,620), while the stocks at mines, factories and in transit

were credited at cost, £233,926 ($1,169,630). During the year there was expended for inspecting and developing the properties, £13,296; first debenture stock redemption sinking fund was credited with £22,093; advances and investments, £214,704; sundry debtors, £112,278; bills receivable, £6,690; cash at bankers, etc., £135,664. In reviewing these assets it is noteworthy that the £214,704 ($1,073,520) credited to advances and investments shows a considerable increase as compared with the previous year. The greater part of this money has been invested in good securities.

The profits for the year, after providing for all management and administration expenses, amounted to £250,209 ($1,251,045). This is £7,800 ($39,000) less than the previous twelve months, owing partly to the lower prices received for some products. It should also be said that the reduction in profits would have been heavier had not the company practiced close economy in its operations and kept the cost of production as low as possible. Deducting from these profits the sum of £50,825 for income taxes and interest on debentures; £22,000 for the interim dividend on the preferred stock, paid on May 1, 1902, and £30,000 for two interim dividends on the ordinary shares paid May 1 and August 1, 1902, there remains, with the amount of £15,795 brought forward from last account, the sum of £163,178 to be dealt with. From this £15,000 has been placed to the depreciation reserve fund, and £5,825 to the debenture stock redemption sinking fund. Of the balance of £142,353 there was taken £37,000 for the final dividend on the preference shares (making 5½ per cent for the year), and for the third interim dividend on the ordinary shares, paid on November 1. The directors now propose to pay a final dividend of £1 per share (£60,000), less income tax, on the ordinary shares, making 17½ per cent for the year; to place to general reserve, £20,000; to write off for expenditure on inspection and development of properties, £13,496, and to carry forward to the next account, £11,857.

Since the last accounts were published, the directors have authorized 5 per cent second mortgage debenture stock to the amount of £400,000, of which £150,000 was issued last April. The full amount was applied for by existing holders of shares and debenture stock.

The working of the mines, deposits and factories generally during the past year has been of a satisfactory character. The manufacturing plants have been kept in repair.

Daly West Mining Company, Utah.

The report of this company covers the year ending December 31, 1902, and shows, upon the whole, a prosperous condition of affairs. The total receipts of the company from ore sales were $1,827,586, and the dividends paid during the year amounted to $1,044,000, as shown in the table below.

The president's report, outlining the events of the year, says that in order to put the company in better position in its dispute with the Quincy Mining Company, an interest was purchased in the Little Bell Mining Company at a cost of $100,000. The property was also increased by the purchase of the Dolberg group at a cost of $14,582. Under the resolutions adopted at the last meeting of the stockholders, the company has been re-incorporated under the laws of Colorado and all the stock of the old company has been exchanged for that of the present corporation. The dispute with the Quincy Company was finally settled by a compromise. The Daly West Company bought the property of the Quincy Company, paying therefor 30,000 shares of its stock. These were provided by increasing the total capital of the Daly West Company from 150,000 to 180,000 shares. With the completion of this agreement and the removal of all trouble from litigation, the company has been placed in a solid position, and in July the dividend rate was increased from 40 to 60c. per share monthly. In May a contract was entered into with the American Smelting and Refining Company, fixing a price of $3.50 per 100 lbs. for the lead content of the ores. This contract ran until January 1, 1903, and has since been renewed to run until March 1, 1904.

After the accident of July 15, caused by the explosion of giant powder in the magazine and killing 34 men, the board resolved to make provision for the families of those killed. In carrying out this policy the sum of $62,729 was paid out. Settlements have been made with all claimants, with the exception of three or four, whose claims are now in process of adjustment.

The title to the right of way from the mouth of the tunnel to the railroad yard and stamp mill at Park City has been perfected, and an agreement has been concluded with the railroad company for the reduction of switching charges. Upon the whole, the position of the company is now considered to be a favorable one.

The statement of the earnings and expenses for the year may be summed up as follows, the averages being calculated on the total ore sold:

	Amount.	Per ton.
Ore sales	$1,827,586	$27.96
Miscellaneous receipts	4,052	0.06
Total	$1,831,638	$28.02
Mine expenses	$339,202	$5.19
Prospecting	71,972	1.10
Ore expenses	78,736	1.20
Mill account	64,147	0.98
General expenses	53,094	0.81
Mine construction	3,128	0.05
Mill construction	15,375	0.24
Total expenses	$625,654	$9.57
Net earnings	$1,205,984	$18.45

To the surplus above shown is to be added $271,143, brought forward from the previous year, making a total of $1,477,127. The payments from this surplus included, as above stated, $62,729 on account of the accident, $194,582 for the purchase of property, $300 for railroad track and $1,044,000 for dividends, leaving a balance of cash on hand at the close of the year, amounting to $255,516. The total amount of dividends paid from the first incorporation of the company up to the end of 1902 was $2,259,000.

The ore statement for the year is as follows, with the metal contents also shown:

	Crude ore.	Crude "Q."	Concentrates.	Oxides.
Dry tons	33,665	17,099	14,148	451
Gold, oz.	1,407	920	598	19
Silver, oz.	1,927,237	856,304	780,431	11,824
Copper, lbs.	1,302,382	511,531	589,857	.....
Lead, lbs.	14,457,002	6,357,429	8,920,441	71,878
Zinc, lbs.	12,036,721	2,350,587	5,032,207	57,928
Sale values	$957,986	$388,040	$477,155	$4,405

The total ore was 65,363 dry tons; the total contents being 2,944 oz. gold, 3,575,796 oz. silver, 2,403,670 lbs. copper, 29,906,750 lbs. lead and 19,477,443 lbs. zinc; the total sale value $1,827,586. The averages were as follows:

	Crude.	Crude "Q"	Concentrates.	Oxides.
Gold, oz. per ton	0.04	0.05	0.04	0.04
Silver, oz. per ton	57.02	50.07	55.16	26.22
Copper, per cent	2.00	1.50	2.10	....
Lead, per cent	21.47	18.58	31.52	7.87
Zinc, per cent	17.90	6.80	17.70	6.40
Value	$28.46	$22.69	$33.72	$9.77

General Superintendent J. A. Kirby reports that during the year 8,401 ft. of openings were run for the purpose of developing and extracting ores. The gross product of ore is given above; reserves of ore have been largely added to by the work done during the year. During the first five months of the year delay was caused by inability to hoist all the ore which the mill could treat, but since June this trouble has been entirely done away with. Improvements included a new blacksmith shop, a bunk-house, and an addition to the mill is being built for the installation of slime tanks and tables.

Mill Superintendent F. W. Sherman reports that 59,207 dry tons of ore were milled during the year, although nearly 82 days were lost on account of the delay in hoisting, already referred to, in the first part of the year. The average grade of ore milled was 8.1 per cent lead and 18.3 oz. silver. The loss in the tailings was 0.5 per cent lead and 4.84 oz. silver. The ore contained 4.2 per cent iron and 7.9 per cent zinc. The losses in the tailings of these metals were 2.05 per cent iron and 4.74 per cent zinc. The savings were 93 per cent of the lead, and 72 per cent of silver. Since the system of slime-settling and classifying tanks has been in operation, there has been stored a considerable quantity of slimes, carrying an average value of 6 per cent lead and 20 oz. silver. Just how these can be treated to yield a profit, is still an unsolved problem. Besides the lead and silver values the concentrates also contained 84c. per ton in gold, 7.27 per cent in iron, 2.08 per cent copper, 17.72 per cent zinc, 13.70 per cent silica.

The classifying of the slimes and freeing them from the excessive amount of water, as now practiced, is proving very successful. The first expense of the plant was considerable, but the better saving and the higher grade of concentrates will yield a sufficient extra profit to justify the outlay. Since the slime scheme was installed, the mill tailings have had their lead value reduced nearly one-half, and the silver value about 1.5 to 2 oz. per ton. This alone means a considerable saving, and in addition the silica in the concentrates has been reduced 3.5 per cent, which means a saving of freight rates and smelting charges on a considerable amount of waste material during the year.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Connecticut. Annual Report of the Storrs Agricultural Experiment Station. Middletown, Conn.; printed for the State. Pages, 252.

Water Storage on Salt River, Arizona. By Arthur Powell Davis. Washington; Government Printing Office. Pages, 56; illustrated.

Wasserhaltung in Bergwerken. By Aug. Brunne. Leipzig, Germany; Arthur Felix. Pages, 420; illustrated. Price (in New York), $3.75.

Journal of the Mining Society of Nova Scotia. Volume VI, 1901-1902. Edited by H. Piers. Halifax, N. S.; published by the Society. Pages, 104.

Victoria. Annual Report of the Secretary of Mines and Water Supply. 1901. J. Travis, Secretary. Melbourne, Victoria; Public Printer. Pages, 132; illustrated.

Bulletin of the School of Mines of Colorado. Volume 1, No. 4. Golden, Colo.; published by the Technical and Engineering Society. Pages, 96; illustrated.

Report of the Inspector of Coal Mines of the State of Washington. 1901-1902. C. F. Owen, Inspector. Seattle, Wash.; State Printer. Pages, 60; illustrated.

Copper Deposits of New Jersey. By Walter Harvey Weed. Reprinted from *Annual Report* of the State Geologist. Trenton, N. J.; State Printer. Pamphlet, 16 pages.

How to Become a Competent Motorman. By V. B. Livermore and James Williams. New York; the D. Van Nostrand Company. Pages, 232; illustrated. Price, $1.

State of Maine. Report of the Bureau of Industrial and Labor Statistics. 1902. S. W. Matthews, Commissioner. Augusta, Me.; Public Printer. Pages, 216; illustrated.

The "South Africa" Atlas of the Rand. London, England; *South Africa.* Thirteen maps, in board cover. Price (in New York), $1.25; or $1.75 with maps mounted on cloth.

American Society for Testing Materials. Proceedings of Fifth Annual Meeting, 1902. Edited by Edgar Marburg, Secretary. Philadelphia; published by the Society. Pages, 388.

Report of the Results of a Census of the Colony of New Zealand, Taken March 31, 1901. E. J. Von Dadelszen, Registrar-General. Wellington, N. Z.; Government Printer. Pages, 164.

The University of Colorado Studies. Volume 1, No. 2. Arthur Allin and Francis Ramaley, Editors. Boulder, Colo.; published by the University. Pages, 184; illustrated. Price, 50 cents.

Statistical Abstract of the United States, 1902. Twenty-fifth Number. Prepared by the Bureau of Statistics of the Treasury Department. Washington; Government Printing Office. Pages, 580.

Die Geschichte des Eisens in Technischer und Kulturgeschichtlicher Beziehung. Part V. Dr. Ludwig Beck. Braunschweig, Germany; Friedrich Vieweg & Sohn. Pages, 164; illustrated. Price (in New York), $1.75.

The Cyanide Process. An Introduction to the Cyanide Process, Including the Determination of the Applicability of the Process to an Ore. By Dr. Alfred S. Miller. Moscow, Idaho; published by the author. Pages, 56; illustrated. Price, 75 cents.

United States Geological Survey. Twenty-second Annual Report, 1901. *Part I. Directors' Report, with Asphalt and Bituminous Rock Deposits.* Pages, 464. *Part II. Ore Deposits.* Pages, 884. *Part III. Coal, Oil, Cement.* Pages, 764. *Part IV. Hydrography.* Pages, 690. Charles D. Walcott, Director of the Survey. Washington; Government Printing Office. With Maps and Illustrations.

BOOKS REVIEWED.

Mechanics. Problems for Engineering Students. By Prof. Frank B. Sanborn. New York; The *Engineering News* Publishing Company. Pages, 156; illustrated.

This little book contains problems similar to those found in text-books, and in addition, a number which have been developed from actual engineering conditions. The object of the author has been to correlate more closely these every-day practical examples with the important subjects in mechanics. There are about 500 problems, arranged under the three heads of Work, Force and Motion. At the beginning of each section of the book one problem is solved so as to explain the method of solving the others, and to serve as a guide for the student in preparing his notebook. We should think that the book would be of great service to instructors, saving them much trouble in the preparation of problems for their classes.

New Zealand. Papers and Reports Relating to Minerals and Mining. Prepared under the direction of Hon. James McGowan, Minister of Mines, Wellington, New Zealand; Government Printer. Pages, 204; illustrated.

This report contains in the first place the general statement of the Ministry of Mines for 1902, giving the production of the colony of New Zealand for 1901. The statistical report is comparatively brief, but it is supplemented by a number of reports on special branches of mining. Thus, the report of Mr. John Hayes, Inspecting Engineer, gives many particulars about the gold-fields of New Zealand, describing a number of districts and mines, and illustrating machinery used and new devices applied in mining. A considerable space is naturally given to the dredging industry, which contributes so much to the gold production of the colony. Besides the gold-fields, there is a long chapter on the coal mines; this section, like that on the gold mines, containing descriptions of a number of mines, with mine plans, geological sections and illustrations of machinery. The report contains much interesting matter.

Geological Survey of Canada. Annual Report of the Section of Mines for 1901. Elfric Drew Ingall, Chief of Section. Ottawa, Canada; Public Printer. Pages, 160; with tables and diagrams.

The Section of Mines of the Geological Survey of Canada issues a preliminary statement early in the year, giving the general figures of production and of other information, leaving the full report to be issued later. In fact, the figures for 1902 have already appeared, and were given in our issue of March 14. The text of the report for 1901, which now appears, has been somewhat delayed by the printer. It contains, besides the statistical report, which, as we have said, appeared some time before, many interesting details about the production of the different metals, the growth of output and the sources from which it is derived. The material is well arranged and is accompanied by carefully prepared diagrams illustrating the tables. Many details are given of value in relation to the disposition of the mineral production, and tables of imports, exports, etc., are added. The Section of Mines of the Canadian Survey is accomplishing a great deal, especially when it is considered that the means at its disposal are very limited.

Les Richesses Minerales de L'Afrique. By L. De Launay. Paris, France; Ch. Beranger. 1903.

This is an interesting book, descriptive of the ore deposits of Africa, by the well-known geologist who is engineer-in-chief of the mining department of France and professor of mining at the School of Mines at Paris.

At the outset the reader finds an outline of the geology of Africa and a statement of the purpose of the book, which is: To bring together an account of the mineral resources of a continent, a large part of which is under French rule, to demonstrate the application of theories concerning the geographical distribution of ores and to discuss the regional types of metalliferous deposits.

The first chapter deals with gold deposits. This includes regions of varying importance, such as the Transvaal, Rhodesia, Abyssinia, the Soudan, the Gold Coast and Madagascar, together with passing reference to the occurrence of gold along the northern countries of the Barbary coast—Tunis, Algeria, Morocco.

When Prof. De Launay gets to the discussion of the Transvaal, he gives a detailed description of the conglomerate series of the Rand and discusses the origin of the gold in a manner which one would expect to be of great interest, both on account of his reputation and his treatment of the subject. This expectation is amply fulfilled.

Chapter II is devoted to copper. The book evidently was prepared too soon to include any important references to the newly discovered copper districts of northern Rhodesia, in default of which the Namaqua Land mines of the Cape Copper Company come in for the largest share of description.

Chapter III is given to various metals, and affords notes concerning the occurrence of fourteen of the commoner metals, exclusive of iron, to which Chapter IV is devoted. The Algerian mines are described with reference to their geological environment and a good deal of interesting information is given within the space of a few pages.

Chapter V treats of the diamond mines, with particular reference to the geology of the De Beers. Chapter VI describes the phosphate deposits of northern Africa, an important industry, while the next chapter deals with the saline deposits of the desert lands. Petroleum and combustibles are considered in Chapter VIII. This includes the coal-fields of the Transvaal, the importance of which is becoming more realized as that region undergoes industrial development. Chapter IX describes the thermal springs of Africa.

A separate chapter is devoted to the ore deposits of the Mediterranean countries, which are ancient mining ground, and are now under French dominion. Algeria, Tunis and Morocco afford many interesting types of ore occurrence. To these the author does full justice. The concluding chapter (XI) gives additional data and discussion of the mineral occurrences of the Soudan, the Gold Coast, the Congo country, the Transvaal, Rhodesia, Madagascar, Abyssinia and Egypt.

At the end of the book there is a good geographical index, but, curiously enough, no general index to the numerous data which the book contains. The table of contents is given instead. To those who are interested in the exploration and development of the new regions of Africa, in the South, no less than the historic mining countries bordering the Mediterranean, this book, by a brilliant scientific authority, will be a very attractive purchase.

A Text-Book of Quantitative Chemical Analysis. By Frank Julian. St. Paul, Minn.; The Ramsey Publishing Company. Pages, 600; illustrated. Price, $6.

The market for text-books on this subject is already overcrowded, but a work having such merit as the present will always command a ready sale. The author divides his subject up into four parts, with an appendix on industrial methods, and the tables used in chemical arithmetic. Part I covers the several operations in making a chemical analysis. The apparatus used in gravimetric, volumetric and gasometric determinations is described at some length, and this is written in such a practical manner that students, and, indeed, experienced chemists, will find it a great help and guide in the manipulation of the instruments with which they work. It is profusely illustrated with drawings, which are stripped of unnecessary detail, thereby showing at a glance the method of using the apparatus described in the text. Following the definition of terms used in the book, the author goes into the all-important subject of the selection and preparation of a sample for analysis, and the way in which the subject is handled shows him to be cognizant of the difficulties in obtaining an absolutely representative small portion of a large quantity of material. Many practical suggestions are offered. The intricacies of the delicate balances used in exact work are explained, and the instructions for the testing of such a balance are given. Then follows a lengthy description of the several processes involved, such as solution, evaporation, distillation, precipitation, separation, filtration, the washing of precipitates and ignition. Much stress is laid on careful manipulation in conducting a quantitative analysis, and the chemist will find a perusal of this section very instructive.

In the chapter devoted to volumetric analysis, a full description of the apparatus prefaces the methods employed. The value of the several indicators is discussed, and this leads up to the subject of standard solutions, which is ably dealt with.

The author divides the practice of gasometric analysis into two classes—scientific and technical—and takes each separately. So far he has dealt with the measure of chemical reactions in analysis, but it often happens that the physical properties of the individual ingredients of a mixture will afford a ready means of recognizing their presence. Such physical characteristics as density, color, rotation of polarized light, the boiling, melting and congealing points, refraction of light, viscosity, thermal and electrical conductivity, specific heat, vapor pressure, capillarity, voltaic energy and penetrability, each receive a concise description in the work under review, together with the apparatus used in making the several tests.

Uniformity in making the returns of a chemical analysis should receive the attention of all chemists. Results should be tabulated to show in what form, as well as in what quantity the substance exists. With this object in view the author suggests various ways of recording results. Examples of the computations to be made in gravimetric, volumetric and gasometric determinations are given, on which the chemist can base all the calculations of ordinary analysis. As a conclusion to the first part of this excellent treatise, attention is drawn to the many

precautions which must be exercised to ensure correct results. In chemical analysis there is a very large personal equation. Possibly the main cause of erroneous results is due to faulty manipulation, rather than to inaccuracy of the method employed. Experience is the only teacher, and the slightest carelessness on the part of the operator in any one determination, will often render the final results useless. The errors most likely to be incurred are defect in the sample, imperfect weighing and measuring, mechanical losses and gains, imperfect solution, the losses and gains of evaporation and ignition, precipitation, defective separation, filtration and washing, defects in the graduated vessels, impure reagents and in the calculations.

Part II gives exercises. The preparation, properties, uses and the common impurities present in the reagents employed, preface these exercises for practice. These examples have been chosen expressly to cover the principles and expedients employed by the chemist, and to make him familiar with the apparatus. The methods given are intended to act as a guide, and as the book is not meant to cover all the methods of estimating the several compounds, the author refers his students to other standard works written for this express purpose. The twenty-four exercises cover a large field, and provided the student will carefully study the instructions, he will be able to battle with any ordinary analysis, and will be well prepared for the more advanced practice given later.

In Part III the subject of colorimetry receives clever treatment. The several colorimeters, or tintometers are described in detail, attention being drawn to the merits of each for different determinations. The subject of pyrometric analysis, being a branch of quantitative analysis in itself, is only briefly touched upon, but the electrolytic methods for the estimation of copper and nickel are exhaustively dealt with. The author deprecates the extension of the field of electrolytic analysis beyond its legitimate boundaries, and while admitting its superiority over all others in the case of copper, and possibly in that of nickel, he questions its practicability for other metals. Having passed in review the salient points of acidimetry and alkalimetry, Julian branches off into organic chemistry. In the elementary analysis of an organic body, the elements composing it are determined for the purpose of deducing an empirical formula, for learning the proportions of the elements, or, by calculation, the compounds of a mixture. Methods of procedure for such determinations are given in full, as is the case in the proximate analysis of the substance, where it is necessary to find out the grouping of the atoms.

Great care has been taken in the preparation of the articles devoted to the analysis of iron and steel, coal, natural water, fertilizers, alkaloids, oils and fats, soaps, milk and butter, urine and the organic dye stuffs. In many cases two or three distinct methods are described for the estimation of the same substance, and in each case the reactions are explained.

Part IV is headed "Notes on the Methods of Analysis" being an instructive discussion on the several processes employed in the laboratory. The qualities that most commend a method of analysis are accuracy, simplicity and rapidity. The relative importance of these qualities toward a given analysis is dependent on the object for which the analysis is made, and the deductions to be drawn from it. In scientific investigations, the highest accuracy is paramount to all other objects. In technical analysis, accuracy may be subordinated to other qualities, while in industrial analyses the standard of accuracy is usually left to the discretion of the chemist. The degree of accuracy depends primarily on the excellence of the method employed.

In conclusion, the author laments the fact that analytical chemistry is often relegated to a subordinate position in the curriculum of those pursuing a scientific course of study. In the practice of the art, a manual training in the use of instruments of precision is acquired, the perceptive faculties are sharpened, and the discipline of close attention to details and habits of careful observation enforced by the failure inevitably following their neglect.

Viewed as a whole, Julian's "Quantitative Chemical Analysis" is a work to be studied by the student and chemist alike. It is evidently the production of a man who has successfully battled with the intricacies of chemical problems, and who has learned from experience. We regret that such excellent subject matter should be printed on such inferior paper and in such small type. Surely a work of this kind deserves better treatment at the hands of the publishers.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

The Federation of Technical Societies.

Sir.—The contribution in your issue of February 14, in which Mr. Edward Walker announces that there is in England a movement on foot for an entire revision of the relative positions of the various engineering institutions, their objects and their scope, is, I venture to think, very misleading to American readers. So far as I can learn, no such movement is within the knowledge of the councils of the societies referred to. Nor is there any desire that the engineering societies should become benefit-societies in the manner advocated by Mr. Walker. The federation which he prophecies will shortly take place, would be a matter of extreme difficulty and of questionable advantage. In America the federation of the American Institute of Mining Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers has, I understand, never been mooted, as it is felt that independent action is desirable, and that competition in the securing of papers in overlapping fields is advantageous. This feeling also obtains in London. Indeed, the offer made by the late Sir William Siemens, as president of the Iron and Steel Institute, to subscribe the sum of £10,000 towards the erection of a building suitable for the accommodation of the various societies representing applied science in the metropolis, did not meet with general acceptance.

Your correspondent's remarks regarding the Royal Charter of the Institution of Civil Engineers are also somewhat misleading, notably the statement that naval architecture is not referred to. It is true that naval architecture was not named in Tredgold's classic definition of Civil Engineering; nevertheless, "the art of navigation by artificial power for the purposes of commerce" is one of the objects to the promotion of which the Institution is dedicated. With its membership of 7,328, with its income of £26,929, and with its age of 85 years, the Institution of Civil Engineers naturally takes the lead among technical societies, and is able to secure and publish important papers on municipal, hydraulic, mechanical, mining, electrical engineering and on naval architecture, notwithstanding the fact that in each of these branches of engineering there are special societies for detailed investigation. There are in Great Britain forty such engineering societies of more or less importance. Their origin, it must not be forgotten, was the establishment of the Institution of Civil Engineers by Telford in 1818; the Royal Society, established in 1645, and the Society of Arts, established in 1754, having been up to that time the only available vehicles for the publication of engineering discoveries. After the Institution of Civil Engineers, the Institution of Civil Engineers in Ireland was established in 1835, followed by the Institution of Mechanical Engineers in 1847, by the North of England Institute of Mining Engineers in 1852, by the Institution of Naval Architects in 1860, by the Iron and Steel Institute in 1869, by the Institution of Electrical Engineers in 1871, by the Mining Institute of Scotland in 1878, and by the Institution of Mining and Metallurgy in 1892.

The chief difficulty in the way of federation is the vast amount of matter published by the engineering societies. In 1901 Mr. William Whitwell, in his presidential address to the Iron and Steel Institute at Glasgow showed that the eight societies taking part in the congress published in the previous year no less than 6,805 pages, distributed as follows:

	Pages.
Institution of Civil Engineers	1,981
Institution of Mechanical Engineers	644
Iron and Steel Institute	1,173
Institution of Naval Architects	305
Institution of Mining Engineers	1,255
Institution of Electrical Engineers	975
Institution of Gas Engineers	219
Incorporated Association of Municipal Engineers	253
Total	6,805

To this total should be added the 459 pages published by the Institution of Mining and Metallurgy, which did not participate in the congress.

The only instance of successful federation is presented by the Institution of Mining Engineers, in which six local mining institutes have combined, independent action being left to each Institute, and all the papers read being published in one journal. Such federation is distinctly advantageous to the members of the federated societies, but a federation extending over the whole field covered by engineering societies is not feasible.

BENNETT H. BROUGH.

London, Feb. 25, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Sulphur Mining.—Can you furnish me with information in regard to the process of mining sulphur, the location of deposits and methods of refining costs of melting, etc.?—C. S. V.

Answer.—In *The Mineral Industry*, Volume VIII, pages 592-616, is a very complete description by Giovanni Aichino on the method of mining and refining sulphur in Italy, which includes illustrations of the various furnaces used to refine the crude product. Sulphur occurs in many localities of the United States, and in recent years the output has been obtained from (notably) Louisiana, Nevada, Idaho and Utah. The preliminary figures of the production of sulphur in the United States during 1902 give between 8,000 and 9,000 tons, valued at about $250,000, as compared with 7,690 tons, valued at $223,430, in 1901.

PATENTS RELATING TO MINING AND METALLURGY

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending March 10, 1903.

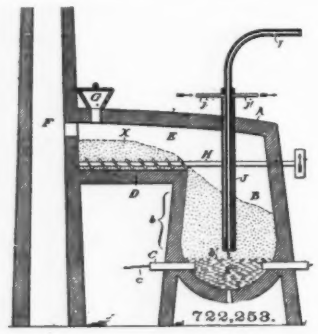
722,211. GRAPHITE-SEPARATOR.—John H. Davis, Glens Falls, N. Y., assignor to United States Graphite Company, Glens Falls, N. Y. Means for feeding powdered graphite to a separator, including a hopper, provided with a series of holes or openings in its bottom, a series of pointed pins adapted to enter said holes or openings and means for reciprocating said pins into and out of said holes, whereby said holes are left completely open at times and are practically completely closed at other times.

722,240. MULTIPLE-CYLINDER PUMP.—William H. Millspaugh, Salem, Ohio, assignor to the Sandusky Foundry and Machine Company, Sandusky, Ohio. In a pump, the combination with a reciprocating device, of two diametrically opposite cylinders communicating at one end with the suction orifice or passage, and two intermediate and diametrically opposite cylinders communicating at the same

end with the discharge orifice or passage, the suction-cylinders communicating with the discharge-cylinders at the other end, pistons in said cylinders connected to said reciprocating device so as to work simultaneously, and valves in said pistons, those in the pistons of the suction-cylinders opening in the opposite direction to those in the pistons of the discharge-cylinders.

722,252. CONVEYER-BELT.—Harry De C. Richards, Sutter Creek, Cal. The combination of a belt provided with longitudinal endless walls, along its edges, said walls being provided with longitudinal grooves therein, with a drum having annular ribs or projections to engage said grooves.

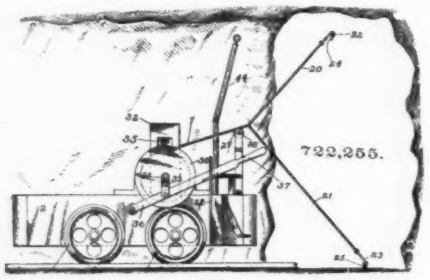
722,253. PROCESS OF REDUCING IRON FROM ITS ORE.—Marcus Ruthenburg, Philadelphia, Pa. A process of reducing iron ores to the metallic state, which is continuous and which consists in detaining each particle of a mass of comminuted ore for a definite time in a region heated to a determined degree less than reducing temperature, but a temperature at which it is capable of being



immediately deoxidized; then progressing the particles of ore in granular form, and at a determined rate through an atmosphere of deoxidizing-gas heated to such a degree as to effect the reduction of the particles during their movement therethrough, without fusing said particles; progressing the reduced metal in granular form, at reducing temperature, into a region of fusing temperature; and fusing the reduced metal.

722,254. PROCESS OF REDUCING IRON FROM ITS ORE.—Marcus Ruthenburg, Philadelphia, Pa. A process of reducing iron ores to the metallic state which is continuous and which consists in detaining each particle of a mass of comminuted ore for a definite time in a region heated to a determined degree less than reducing temperature, but a temperature at which it is capable of being immediately deoxidized; then progressing the particles of ore in granular form and at a determined rate into a region heated to such a degree as to effect the reduction of the particles without fusing them; then progressing the reduced metal in granular form at reducing temperature into a region of fusing temperature, and fusing the reduced metal.

722,255. ELECTRICAL TRACTION DEVICE.—Boyd M. Scott, Coalport, Pa., administrator of Walter W. O'Malley, deceased. A traction device comprising suitable frame and carrying-truck, combined with a motor operatively connected to said truck, a cable-carrying drum rotably mounted



upon the said frame and operatively connected with the motor, a compensating table connected to said drum and thus indirectly placed in communication with said motor, a controller for said motor, a compensating driving-wheel having a shaft mounted in movable bearings, a lever pivotally mounted upon the truck and a link connecting said lever with the shaft of the compensating-wheel.

722,270. ART OF CLEANSING AND IMPROVING THE QUALITY OF IRON AND STEEL.—Frederick C. Weber, Chicago, Ill. A process of cleansing and improving the quality of iron and steel, which consists in melting the same, and in adding thereto when in a molten state metallic borides in chemically equivalent proportions in the form of ternary compounds for causing a chemical reaction and change, whereby impurities may be eliminated and the basic metals of the borides united with the iron or steel.

722,273. SOLDER.—William D. Baldwin, Washington, D. C., administrator of Harry William Neild, deceased, and Frank Campbell, Kent, England. A solder consisting of 5 per cent of aluminum, 5 per cent of antimony and 90 per cent of zinc.

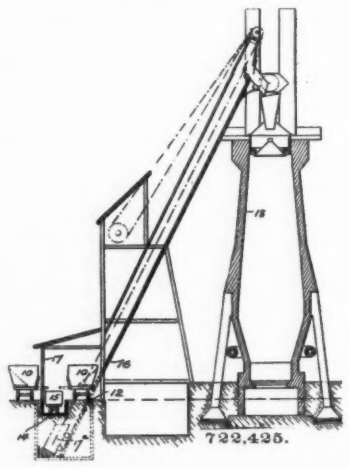
722,314. DISCHARGE MEANS FOR TANKS.—Lebbeus H. Mitchell, Salt Lake City, Utah. A discharge apparatus for tanks provided with a casting having an upwardly-projecting rim, a funnel supported on said rim and having a depending base adapted to enter said casting and means on the contiguous faces of the casting and depending base to lock the funnel to the casting.

722,411. ELECTRIC FURNACE.—Albert A. Shade, Chicago, Ill., assignor of one-half to Eugene Howard Moore, Chicago, Ill. An electric furnace provided with a passage which is inclined from the upper to the lower end thereof and provided in its bottom with a trough-like depression through which the material to be acted upon passes by gravity, electrodes extending into said passage with their inner ends located above the bottom of said trough-like depression in a manner to form a plurality of arcs in said passage, and separate means associated with each pair of electrodes for deflecting or elongating the arcs into said depression toward the material as it passes successively beneath the pairs of electrodes.

722,412. COAL-DRILLING MACHINE.—John W. Shallenberger, Canal Fulton, Ohio, assignor to Warwood Tool Company, Wheeling, W. Va. In a coal-drilling machine, a hollow drill-frame having a lower prong and an upper cross-bar with a hole therein, a vertically-sliding securing-bar movable through the hole in the cross-bar, a clutch device arranged to move the bar upwardly, and an independent clutch device arranged to retain the bar in adjusted position.

722,424. SAND-PUMP.—Charles M. Heeter, Butler, Pa. A sand-pump having a removable lower section surrounding the lower part of its body, a screw-threaded connection between section and the body, and a lock device constructed and arranged to lock said section and body together and to exert a constant rotative pressure upon the screw connection.

722,425. PLANT FOR HANDLING ORES.—An ore-handling plant, comprising a loading device, two sets of traveling bins to be moved adjacent to said loading device for the



ore, and coke and limestone, a scale-lorry disposed between said sets of traveling bins and into which the bins discharge, and a skip arranged to receive material from the scale-lorry and carry it to the top of the furnace.

722,455 PROCESS OF PRECIPITATING GOLD FROM CYANIDE SOLUTIONS.—August Prister, Gradisca, Austria-Hungary. A process for the precipitation of gold and other precious metals from cyanide solutions, such as potassium cyanide, sodium cyanide and bromine cyanide, which consists in acidifying the solution, then adding a mercurous salt in combination with small quantities of a copper salt.

722,464. MANUFACTURE OF ARTIFICIAL STONE.—Charles W. Stevens, Harvey, Ill. An improvement in the manufacture of artificial stone, which consists in forcing a stone mixture in a liquid state into a closed mold provided with a permeable wall, whereby the liquid portion of the mixture is forced out of the mold through the permeable wall by pressure derived by accretion to the solid portion of the mixture.

722,500. APPARATUS FOR TREATING ROCK-ASPHALT.—James S. Downard and Byron A. Roloson, Lima, Ohio. An apparatus for treating rock-asphalt, comprising a separator having a tank, a feed-trough with orifices therein, means for feeding material to the trough, and slide-plates adjustably mounted on the feed-trough to control the orifices thereof.

722,504. STEEL.—Charles H. Halcomb, New York, N. Y. A high-grade steel containing less than 1.20 per cent of carbon, from 6 per cent to 15 per cent of molybdenum, from 2.50 per cent to 6 per cent of chromium and less than 2 per cent of silicon.

722,515. STORAGE APPARATUS.—Arthur C. Johnston, Bristol, Pa., assignor to the Dodge Coal Storage Company, Naugatuck, Conn. The combination in a storage apparatus, of a storage-floor, a pit, a track situated at a given distance from the pit, a traveling car on the track, a crane pivoted on the car, a bucket hung from the outer end of the crane, said crane being arranged to swing from the pit over the storage-floor, so that the bucket can receive material from the pit and, by moving the crane on its pivot, be transferred to any point above the storage-floor.

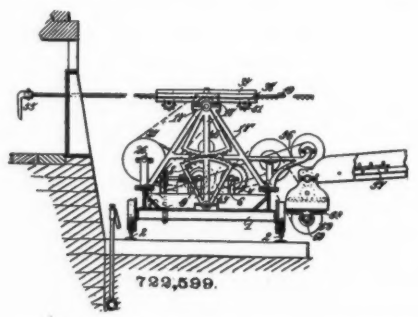
722,555. GAS-DETECTING ATTACHMENT FOR MINERS' SAFETY-LAMPS.—James T. Beard and Matthew D. Mackie, Scranton, Pa. In a miners' safety-lamp, a supporting-frame, a series of wire strands supported, by said frame, over the flame of the lamp, the said wire strands being arranged at varying heights above the said flame, in combination with means for securing the said frame to the wick-tube of the lamp.

722,558. APPARATUS FOR ELASTIC-FLUID COMPRESSION.—Henry Bland, Waverley, near Sydney, New South Wales, Australia. The combination of two sets of toggle-levers coupled together, a floating beam receiving motion from said toggle-levers, and cylinders containing pistons operable by said floating beam.

722,583. SECONDARY ELECTRODE FOR ELECTROLYTIC APPARATUS.—Paul Imhoff, Liverpool, England, assignor to The United Alkali Company, Limited, Liverpool, England. Secondary electrodes consisting of an anode of platinum wires or strips, and a cathode of iron, carbon, or other conducting material of a less expensive character than platinum, in the form of wires, rods, plates, bars, strips, or gauze, and an intervening supporting plate, or body, of non-conducting material; the platinum, wires or strips of the anode being passed through or around the edges of the said supporting plate, or body, and secured to, in, or around the respective wires, rods, plates, bars, or strips, or gauze, constituting the cathode material.

722,595. DREDGING-MACHINE.—William W. Lea, Iron River, Wis. In a dredging-machine, the combination with mechanism for alternately pulling a scoop in opposite approximately horizontal directions, of a scoop provided with means whereby, under such alternating stress, it will be caused, by frictional contact with the water, to descend and ascend in inclined directions.

722,599. COKE-DRAWING MACHINE.—Burton J. Matteson, Trinidad, Colo. In a machine of the class described, a laterally movable and tiltable draw-bar, a shaft, mechan-



ism for oppositely rotating said shaft, a spherical portion fixed to said shaft and a power-transmitting member for actuating said draw-bar, having a spherical seat to receive said spherical portion and rotative with the latter.

722,626. PROCESS OF MANUFACTURING PLASTIC OBJECTS FROM PEAT.—Nicolaus Reif, Wunstorf, Germany. A process of manufacturing plastic objects from peat, wherein the binding material, in a suitable finely-divided condition, is forced into the peat at a high pressure as a microscopically-fine powder, the whole, by means of an oxidizing agent supplied in the same manner, being converted into a solid condition, in which operation, in order to permit uniform oxidation of the particles of the mass, the oxidizing agent is vaporized if desired during the spraying thereof, so that while retaining the fibers, a product of a felty and most homogeneous structure is obtained, at the same time employing the smallest possible quantities of binding agent.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending February 21, 1903.

1961 of 1902. ELECTRIC FURNACE.—J. Girlot, Jette St. Pierre, Belgium. Improved furnace for heating metallic articles in an electric bath.

14,449 of 1902. ROCK-DRILL FEED.—J. R. Churchill, London, and C. H. Champion, Sheffield. Improved feeding device for rock drills.

16,459 of 1902. STAMP-MILL MORTAR.—F. J. Pollard, Johannesburg, S. A. A mortar box for stamp mills having two pipes on each side to convey water to the interior of the box.

19,088 of 1902. SLUICE-BOX.—A. M. G. Sebillot, Paris, France. Improved sluice-box for washing gold gravels.

20,930 of 1902. BLAST FURNACE.—E. Servais, Luxemburg. Improved shape for blast furnaces partially using gaseous fuel.

21,841 of 1902. WATER-FEED FOR ROCK DRILLS.—Ingersoll Sergeant Drill Company, New York, U. S. A. Improved method of feeding water to the face of rock drills.

28,290 of 1902. TREATING COPPER MATTE.—G. Mitchell, Naco, Arizona, U. S. A. Feeding hot silica to copper matte while it is being treated in acid lined converter.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. F. W. Baker sailed on the *Umbria* on March 18.

Mr. John B. Hastings has gone to Prince of Wales Island, Alaska.

Mr. Charles D. Lane left New York City for San Francisco on March 14.

Mr. James A. L. Henderson sailed for London on the *Umbria* on March 18.

Mr. Theodore Douglas, of New York City, has returned from Sonora, Mex.

Mr. Henry C. Perkins, of Washington, was in New York City during the week.

Mr. Harold Rickard is at the La Sal copper mines, on the western border of Colorado.

Mr. Martin J. Heller, engineer to Capt. De Lamar, is now at San Francisco, Cal.

Mr. H. E. Carey, of Salt Lake, Utah, is in Mexico looking for mining investments.

Mr. William R. George, of New York City, has returned from Zimapan, Hidalgo, Mex.

Mr. A. S. Harvey, of Leadville, Colo., is operating in the Ocotlan District of Oaxaca, Mex.

Mr. S. F. Emmons, of the United States Geological Survey, was in New York City last week.

Mr. W. H. Shockley left on the *Oceanic* on March 11, after a successful professional trip to Texas.

Mr. Ernest A. Wiltsee and Mr. Henry Butters are in New York City, stopping at the Waldorf-Astoria.

Mr. Donald Gillies has returned to Butte, Mont., from an extended pleasure trip to California points.

Mr. E. Y. Lilgigran, formerly of Rossland, B. C., is examining the Gold Hill Mine, near Sumpter, Ore.

Mr. J. G. English, of Danville, Ill., is at Sumpter, Ore. He was the former owner of the Golconda Mine.

Mr. Edwin B. Kimball, of Oroville, Cal., sailed on the *Alleghany* for Cartagena, Colombia, on March 14.

Mr. Frank B. Rae, consulting engineer to the Cananea Company, has just returned from the Southwest.

Dr. R. W. Raymond now writes to his friends from Naples, Italy. He is expected home early in April.

Mr. Charles Butters returned from London last week, and is now at the Waldorf-Astoria, New York City.

Messrs. A. E. Smith and C. E. Carter, of Lowell, Mass., have been in Sumpter, Ore., where they have mining interests.

Mr. P. J. Queally, manager of the Kemmerer, Wyo., coal mines, recently examined the coal fields of Emery County, Utah.

Mr. E. P. Spalding, who has been at Helen Bay, Alaska, is now manager of the Monarch Mining Company, at Murray, Idaho.

Prof. H. A. Wheeler has returned to St. Louis after examining copper properties in the States of Colima and Jalisco, Mex.

Mr. Hudson H. Nicholson, mining engineer, has returned to Denver from an inspection of mining property in Gilpin County, Colo.

Mr. L. L. Patrick, of Denver, Colo., has taken the general management of the Tonopah Syndicate Gold Mining Company, of Tonopah, Nev.

Mr. A. Winslow, manager of the Liberty Bell Mine at Telluride, Colo., has been in Utah, examining milling methods at the principal camps.

Mr. A. S. Dwight, manager of the San Luis Potosi Smelter of the Mexican Metallurgical Company, has been in El Paso and Cananea on business.

Mr. Anthony J. McMillan, managing directors of the Le Roi Mining Company, is in New York City on his way from London to Rossland, B. C.

Mr. A. B. Carpenter, mining engineer in the City of Mexico, left early in March for a several months' trip to the neighborhood of Tepic on professional work.

Mr. R. J. Coleman, who for years was in charge of Mr. Samuel Newhouse's interests in Utah, is again in Mexico, looking after his mining ventures.

Mr. F. P. Mills, formerly superintendent for the Merced Mining Company at Coulterville, Cal., is now superintendent of a coal mine at Robson, W. Va.

Mr. W. J. Clark, foreign manager of the General Electric Company, recently sailed for Europe after a visit of nearly three months' duration to this country.

Mr. A. B. Rich, of Denver, Colo., is now assayer at the Silver Bell Mine, near Telluride, Colo., succeeding Mr. A. C. Gates, who resigned to go to Globe, Ariz.

Capt. Aliene Case, formerly superintendent of the Cornucopia mines of Cornucopia, Ore., and now manager of the Canadian Lead Company, has gone to Europe.

Mr. H. G. Turner, financially interested in the mineral resources of India, is visiting the United States. He also intends to go to Cape Breton, Nova Scotia.

Mr. D. Nevins, of San Francisco, Cal., has just been made superintendent of the Creston Colorado Mining and Smelting Company, at Minas Prietas, Sonora, Mex.

Mr. Frank Fitch, formerly with the Pride of West Mine, at Washington, Ariz., now has charge of the qualitative laboratory at the Arizona School of Mines, Tucson, Ariz.

Mr. William S. Caruthers, of Seattle, Wash., a civil engineer, who is interested in some gold properties in the State of Oaxaca, Mex., is in New York City for the present.

Mr. Frank Nicholson, of Joplin, Mo., had the misfortune to injure his knee-cap quite recently, and is compelled to take a holiday. He sails for the Mediterranean on March 28.

Mr. Francis L. Bosqui has returned to Jardine, Mont., where he will remain for some months in charge of the cyanidation work of the Kimberly-Montana Gold Mining Company.

Mr. E. W. Walker, formerly chief engineer, is now assistant superintendent of the Tombstone Consolidated Mining Company, at Tombstone, Ariz., succeeding Mr. H. J. Gray, resigned.

Prof. Robert H. Richards, of the Massachusetts Institute of Technology, gave an address on "Ore Dressing" to the School of Mines students of Columbia University on March 13.

We find it necessary to state that Mr. R. A. Vaughn, of Tonopah, Nevada, is not a correspondent of the ENGINEERING AND MINING JOURNAL, and that he does not represent the paper in any way.

Mr. Edward L. Leeds, of London, England, the European representative of the Brown Hoisting Machinery Company, Cleveland, O., has sailed from New York City after a visit of about 2 weeks.

Mr. George A. Anderson, general manager of the Gold and Silver Extraction Company of America, Limited, who has been in Scotland for the last two months, returned to Denver, Colo., on March 8.

Mr. William De La Barr, of Minneapolis, Minn., has been in Magdeburg, Germany, buying machinery for the briquette works that Mr. W. D. Washburn intends to build at the lignite mines, near Bismarck, N. D.

Mr. J. Nelson Nevins, recently of Sombrerete, Mex., has been apointed general manager of the properties of the Sierra Madre Mining and Development Company. His headquarters will be at Hermosillo, Sonora.

Mr. G. D. Case has resigned as superintendent of the Washoe smelters of the Amalgamated Copper Company at Anaconda, Mont., and has accepted a similar position with the Copper Range Company, near Houghton, Mich.

Mr. Godfrey D. Doveton, late metallurgist for the Camp Bird, Limited, has formed a partnership with Mr. Chester W. Purington, as consulting mining engineers and metallurgists, with offices in the Majestic Building, Denver, Colo.

Mr. John Williams, consulting engineer of the Alexandro Copper Mining Company, of Silver City, N. M., was in Denver, Colo., recently to purchase machinery for the new leaching plant which this company expects to erect at once.

Mr. J. M. Dikeman, until recently superintendent of the Red Boy Consolidated Company in Eastern Oregon, passed through Denver, Colo., a few days ago on his way to Rhodesia, Africa, where he will be consulting engineer for an English company.

Mr. Grant Snyder, who has been manager for the Utah & Eastern Copper Company, operating the Dixie Mine, below St. George, Utah, recently resigned to go with the Western Exploration Company. Mr. James E. Beveridge succeeds him.

Mr. Isidor Davidov, consulting engineer to the Santa Gold Placer Company and the Santa Margarita, El Cordero and Los Clures gold mining companies in the Department of Antioquia, Colombia, is now in New York City, where he will remain a few months.

Mr. J. E. Robertson, of St. Louis, Mo., who for several years has been in charge of the W. S. Tyler Company's interests in Mexico, with headquarters in Monterey, has recently moved to El Paso, and will make investigations for the company in Northern Mexico, Texas, New Mexico and Arizona.

Mr. Guy W. Buxton, who has been for some time connected with the New York office of the H. W. Johns-Manville Company, has been recently appointed auditor of that company, the branches of which are located in Milwaukee, Chicago, St. Louis, Pittsburg, New Orleans, Cleveland, Boston and Philadelphia.

Prof. J. W. Jenks, of Cornell University; Mr. Edward Brush, of the American Smelting and Refining Company, and Mr. Charles A. Conant, of the Morton Trust Company, have been invited by the Mexican Government to meet the monetary commission recently appointed by President Diaz, and have accepted.

Mr. David H. Matson, manager of Castner, Curran & Bullitt, at Roanoke, Va., has sent in his resignation to take effect on April 1. Mr. Matson became manager of the company when it was organized in 1896, and before that had been president of the Pocahontas Coal Company. Mr. Matson has been identified with the coal business for 19 years.

OBITUARY.

James S. McHugh, 75 years old, died recently at Pittsburg. He was born in Bellefonte, Pa., and for a number of years yas superintendent of the mines of the Kittanning Coal Company at Gallitzin. He was later in the employ of the H. C. Frick Coke Company. He leaves a widow, a son and a brother.

E. A. Darling, the general superintendent of the Edison Cement Company, whose works are at New Village, N. J., died March 15, aged 37 years, of the effects of burns received by the explosion of pulverized coal at the works on March 2. He lost his life in endeavoring to warn workmen of their danger. Mr. Darling was formerly superintendent of Columbia University, having charge of the engineering work involved in moving the University to its present site on Moringside Heights, New York City.

SOCIETIES AND TECHNICAL SCHOOLS.

AMERICAN CHEMICAL SOCIETY.—A section of this society was recently organized in Pittsburg, Pa., with A. G. McKenna, chairman; J. M. Camp, vice-chairman; Dr. F. C. Phillips, councillor; H. C. Beggs, treasurer, and G. P. Maury, secretary.

SOCIETY OF ELECTRO-CHEMISTS AND METALLURGISTS.—The following council has been elected: President, J. W. Swan; vice-presidents, Prof. A. Crum-Brown, Lord Kelvin, Sir Oliver T. Lodge, Ludwig Mond, Lord Rayleigh, Alexander Siemens, James Swinburne; council, George Beilby, Bertram Blount, A. G. Charleton, W. R. Cooper, Sherard Cowper-Coles, F. G. Donnan, Prof. A. K. Huntington, R. A. Lehfeldt, F. M. Perkin, W. S. Squire, O. J. Steinhart. The secretary is F. S. Spiers, 82 Victoria Street, London, S. W.

CORNELL UNIVERSITY.—Prof. L. M. Denis was recently appointed head of the department of chemistry to succeed Prof. Caldwell, retired.

Assistant Professors W. D. Bancroft and F. Merritt are promoted to professorships of physical chemistry and physics, respectively. Instructors J. T. Parson and A. C. Phelps are promoted to assistant professorships of civil engineering and architecture, respectively.

An anonymous gift of $150,000 has been received for the foundation of a co-operative professorial pension fund, and the trustees have adopted a detailed scheme for the pensioning of Cornell professors.

The site of the new Rockefeller Hall of Physics is to be parallel with White Hall and McGraw Hall.

AMERICAN CHEMICAL SOCIETY—NEW YORK SECTION.—At the meeting on March 6 last Dr. H. W. Wiley made an address in regard to the International Congress of Applied Chemistry at Berlin next summer, stating that next to Germany the United States will have the largest membership.

A paper on "Paints" was read by Mr. Houston Lowe, of Dayton, O., illustrated by samples of painted strips or panels, showing the durability of oil alone and mixed with various pigments. Mr. Lowe said in part that the slower drying oil or paint was the more durable, and that he was averse to the use of boiled oil in any but varnish paints. Pigments are used not only for color, but also to permit of the application and retention on the surfaces painted of

more oil; also for the mechanical protection which the pigment furnishes to the oil. Two strips were shown on which the same measured volume of oil and of mixed paint were applied successively, and dried until it had all been applied. It required 24 coats of the oil alone and 10 coats of the paint to get the equal volumes on the strips. Pigments are classified as inert and as combining with the oil (saponification); oxide of iron and silica being typical of the former, while all the lead pigments are of the latter character. Of the lead pigments, red lead makes the most insoluble soap.

Dr. Maximilian Toch read a paper on the permanent protection of iron and steel; advocating portland cement, under proper conditions, as to composition, application, etc. A cement to be suitable for protection of iron must be free from calcium sulphate and iron. The protective action is due to the liberation from tricalcium silicate, of free lime in the act of setting. This combines with any free carbonic acid, and prevents its well known effect in corroding iron in presence of moisture.

These papers caused a lengthy discussion, in which the porosity of films of linseed oil was maintained by some members and denied by others.

Prof. S. H. Sabin noted the requirements of good paint, and especiany that the increasing fineness of the pigment was of increasing value in all its relation to the mixed paint.

Mr. Lowe said that one important difficulty in getting good results with paint was the "personal equation" of the painter. To such an extent is this so that a poor paint applied by a sensible and competent painter will give better service than a good paint applied by a careless operator. Bridge Commissioner Lindenthal discussed the necessity for the best possible protection of suspension bridge anchorages and hoped the facts in regard to cement and concrete could be so definitely stated by the chemist that the engineer could safely adopt them in his specifications in important works.

INDUSTRIAL NOTES.

The Link Belt Machinery Company, of Chicago, Ill., has sent a representative to the far East.

The Borden & Selleck Company, of Chicago, Ill., is about to erect a complete coal-handling plant for the Detroit City Gas Company's station A, Detroit, Mich.

The Velardena Mining and Smelting Company, of Velardena, Durango, Mex., has placed a contract for 2 locomotives with the H. K. Porter Company, of Pittsburg, Pa.

The firm of Victor M. Brashi & Brother, Mexico City, Mex., has placed a substantial contract for electrical machinery with the Stanley Electric Manufacturing Company, Pittsfield, Mass.

The Mine and Smelter Supply Company, of Denver, Colo., shipped lately 3 Durkee drills and a modern gas engine, to Juneau, Alaska; also a $1,000 assay outfit complete, to W. A. Houck, of El Paso, Tex.

The Main Belting Company has opened an office in the Mutual Reserve Building, New York City, where it will receive orders for Leviathan belting to be used for power transmission, or for conveying and elevating materials.

The Ingersoll-Sergeant Drill Company, through its New York office, has secured a contract for a large drilling plant from C. Gordon Patterson, the contractor for the construction of a section of the Barrientos Tunnel, for the Mexican Central and National roads.

The Pressed Steel Car Company, of Pittsburg, Pa., is furnishing the Etna & Vesuvius Coal Company 16 flat bottom gondola cars, with twin hoppers, 80,000 lbs. capacity, and the Raritan River Railroad Company, with 6 low-side gondola cars, 80,000 lbs. capacity.

The Ironsides Company of Columbus, O., manufacturing special lubricants and preservatives for a variety of purposes, recently held a convention lasting several days at the Hartman Hotel in Columbus, culminating in a banquet. A majority of the company's sales agents were present.

The National Fire Brick Company is enlarging its plant at Strasburg, O., to a daily output of 350 tons of fire clay materials. The company has lately installed the largest steam shovel ever built by the Marion Steam Shovel Company, weighing 107 tons, to strip its land and dig both fire clay and coal.

The Brown Hoisting Machinery Company, of Cleveland, O., has been awarded a contract for the installation of 3 electric shipbuilding cranes, averaging 20 tons capacity each, in the Harland & Wolff yards, Belfast, Ireland. Each of the cranes will be over 2 shipways, and will be mounted on a trestle 120 ft. high and 600 ft. long. The value of the contract is about $300,000.

The Jeanesville Iron Works Company, of Jeanesville, Pa., through its Denver branch, has shipped a large triple expansion pump, having a capacity of 2,100 gal. per minute, to the El Paso Consolidated Gold Mine, Cripple Creek, Colo. This pump is of the latest pattern, fitted with Corliss steam valves. Three large cars were needed to carry it.

The Stilwell-Bierce & Smith-Vaile Company, of Dayton, O., recently secured a contract for a complete water works for installation in Ponce, Porto Rico. The contract, which is valued at $63,000, includes 2 compound pumping engines having a combined capacity of 5,000,000 gals., 400 tons of cast iron water pipe, varying from 6 in. to 14 in. in diameter, and a 450-h.p. boiler plant.

The firm of Bonnevie & Lee, consulting engineers, of Denver, Colo., is now making plans and specifications for a 100-ton mill to be erected at the Crown King Mine, Yavapai County, Ariz., for the treatment of 50,000 tons of tailings, carrying values in gold, lead, copper and zinc. The treatment will be a combination of magnetic separation, concentration and cyanidation. The mill will be designed to carry the ore through the different processes automatically and cheaply, and will be in operation this coming summer.

Shipment has been made by the Westinghouse interests of 2 1,000-kw. steam turbines, to be installed in the plant of the De Beers Consolidated Diamond Mines, Kimberly, South Africa. The machinery is to be used for lighting the mines and operating the machinery, and any surplus energy is to be utilized for lighting a portion of Kimberly. The Westinghouse interests recently were awarded a contract for the complete electrical equipment of the British iron and steel plant, operated by Sir W. Samuelson & Co., Limited, Middlesborough, England.

The Crawford & McCrimmon Company, of Brazil, Ind., builder of hoisting engines, steam pumps, ventilating fans, etc., reports a heavy demand for its machinery, and orders enough in hand to tax the capacity of the plant for several months. The company recently shipped to the Alabama Steel and Wire Company a double hauling engine, 24 by 36; to the Atlas Coke Company, Waltersburg, Pa., a 20 by 36 in., and a 15 by 30-in. engine to Strawn, Tex. The company has filled a number of orders for ventilating fans and engines of various capacities.

The Lidgerwood Manufacturing Company, of New York City, having a plant at South Brooklyn, has purchased a large tract of land at Newark, N. J., and will remove its plant from Brooklyn, believing that it can secure much better facilities. A representative of the company recently said that walking delegates and factory inspectors roamed through the plant trying to earn their salaries by interfering with work. New York is no place for a large manufactory, while in New Jersey the condition are directly opposite. The company may take a couple of years in transferring the works.

The New Market Zinc Works, of Baltimore and Knoxville, is a company organized with $500,000 capital to mine and concentrate zinc at works located at New Market, Tenn., and expects to be ready to make shipments by May 1. The officers are R. S. Terry, Lynchburg, Va., president; F. W. Patterson, Pittsburg, Pa., vice-president; John H. Foss, Baltimore, Md., treasurer; Charles A. Weller, Knoxville, Tenn., general manager; T. Edward Gresslee, Baltimore, Md., secretary, and John Curran, New Market, Tenn., superintendent. Main office, 221 St. Paul Street, Baltimore, Md.; branch office, Empire Building, Knoxville, Tenn.

The Passaic Steel Company, of Paterson, N. J., recently elected these officers: Directors, Henry F. Bell, Paterson, N. J.; J. Barclay Cooke, Paterson, N. J.; Walter E. Cooke, New York City; A. C. Fairchild, Paterson, N. J.; Charles Harris, New York City; Stanley R. Ketcham, Philadelphia, Pa.; Geo. A. Lee, Philadelphia, Pa.; B. Nicoll, New York City; Dudley Phelps, New York City; F. F. Searing, Paterson, N. J.; Thomas B. Simpson, Philadelphia, Pa., and Louis A. Watres, Scranton, Pa. The officers are A. C. Fairchild, president; F. F. Searing, vice-president, and J. Barclay Cooke, secretary and treasurer.

TRADE CATALOGUES.

The Chicago Pneumatic Tool Company, of Chicago, Ill., says it is continually on the lookout for new devices which fit in with its line of pneumatic appliances, and has within the past few months brought out the Chicago rock drill, and the Chicago compression riveter. Both these machines are illustrated and fully described in attractive circulars, which the company is mailing to the trade.

The Fort Wayne Electric Works, of Fort Wayne, Ind., has published a fan motor catalogue which illustrates and describes the various styles of fan motors the company is introducing this year. The motors are manufactured for both direct and alternating current. They are also made in 2 distinct types; the revolving and the desk type. The revolving type is different from anything that has heretofore been placed on the market. The desk type operates an 8-in. fan, which gives just enough and not too much of a breeze. The company calls attention particularly to the very small amount of energy required to operate the motors.

"New Knowledge on Belt Management" is the title of a cloth-bound pamphlet of 72 pages issued by the Cling-Surface Manufacturing Company of Buffalo, N. Y., calling attention to the advantages to be gained by the use of Cling-Surface, a dressing claimed to improve the fiber of leather, cotton or rope belting, and not to hurt rubber. By its use the whole power of the strongest belt can be utilized with the belt running slack. The pamphlet also gives some useful advice upon the treatment of belts and contains the names of a long list of users of Cling-Surface in the United States and in foreign countries.

Gasoline engines and hoists made by the Weber Gas and Gasoline Engine Company of Kansas City, Mo., are described in a neatly illustrated pamphlet of 72 pages, sent out by the company. This shows the construction of Weber engines, which are made to use gasoline, fuel-gas distillate, producer gas, crude oil or natural gas as fuels, and are built in sizes from 5 to 72 h.p. The company also makes portable engines having a capacity of 5 to 16 h.p. The Weber engines have been used in mines, in irrigation work and for driving eelctric motors. The company also makes a variety of hoists, those using gasoline being from 2½ to 50 h.p. Certain sizes or these are sectionalized for mule-back transportation. The company also supplies air compressors, which may be direct connected to a Weber engine or driven by a belt.

SPECIAL CORRESPONDENCE.

Denver. **March 14.**

(From Our Special Correspondent.)

The American Smelting and Refining Company has announced another increase in the price of lead paid to mine operators. The increase a few days ago was from $3.50 to $3.75 per 100 lbs. The company now announces another increase of 15c., making $3.90 the new basis of settlement. This means an increase in the value of low-grade lead ores of from 80c. to $1 per ton, and a still greater increase on higher grade lead ores.

Governor Peabody recently received a statement of demands made by the Western Federation of Miners upon the mill owners at Colorado City and the several replies thereto. He went personally to the scene of the strike with President Moyer, of the Western Federation of Miners. At Colorado Springs, the Governor saw the sheriff of El Paso County, and at Colorado City interviewed Mayor Faulkner and Town Marshal Birdsall. He then went through the mills of the different reduction companies, and talked with about 100 employees. The Governor did not consult with the superintendents, or managers, or owners of any of the mills, and did not see them, except at an informal reception tendered him in the evening at the Antlers' Hotel, Colorado Springs. He also heard the statements of President Moyer and the executive committee of the Mine and Smelter Men's Union.

Governor Peabody has stated that he learned from the men employed that they fear, by reason of threats from unknown parties, injury to their persons, families or homes, and he is fully convinced of the necessity of maintaining the militia at that point for the present. He could not, however, find that threats were made directly by members of the local union, or by persons who were known, or could be identified as connected with such union. The Governor further says that the men employed in the mills seemed to be industrious, law-abiding citizens, many of them having lived in El Paso County for from 1 to 15 years, owning property and having families.

While at the Standard Mill, Governor Peabody was presented with a statement, signed by every employee of the plant, stating that the treatment offered by the company, hours of labor and wages paid, were satisfactory, and that the management had been willing to listen to employees, and had adjusted promptly any reasonable grievance. The men objected to being accosted and delayed on the way to and from work. The signatures were accompanied by a statement of the wages received by each man, and the length of time he had been in the mill.

Governor Peabody on March 12 sent a letter to the managers of the 3 mills concerned, and to President Moyer of the Western Federation of Miners, requesting them, with counsel, to meet at his office in the Capitol Building, Denver, on March 14.

President Moyer, of the Western Federation of Miners, on the evening of March 12, issued a statement that unless a settlement of some sort was made by the mill owners with the strikers by March 16, the Union miners in the Cripple Creek District would strike.

San Francisco. **March 12.**

(From Our Special Correspondent.)

The United States Supreme Court has affirmed the decision of the California courts in the suit between the Kennedy and Argonaut mines at Jackson, Amador County, for value of ore extracted beyond the

boundaries of one of the mines, and was over apex rights. The Argonaut Company claimed the ore extracted by the Kennedy through owning an adjoining claim, having the apex of the vein forming the orebody in the Silva claim from which the ore in dispute was extracted. The Superior Court decided in favor of the Argonaut, as did the Supreme Court of California. Now the United States Supreme Court confirms the decision. The case has been long pending.

The famous Spring Valley gravel mine at Cherokee, Butte County, which is supposed to have yielded from $12,000,000 to $15,000,000 in its early history, has been sold to W. P. Lynch, and will again be worked. Many injunction suits were instituted against this company for dumping its tailings into streams, it was finally closed, and for many years has been practically idle. The reservoir system and Concow ditch system has been purchased from the Bay Counties Power Company, to have a good water supply. Whether the property is to be again worked by hydraulic process, with the necessary impounding dams, or whether it is to be worked as a drift mine, the new owner refuses to say.

The Copper King Mining Company, at Clovis, Fresno County, is not yet out of the financial troubles, alleged to be due to the extravagance of the former manager. Many liens have been filed against the company for labor, supplies, etc., but no funds have been sent from London to settle the claims. The last attachments filed covers real estate anywhere in the county standing in the company's name.

The Associated Oil Companies claim to have in the McKittrick District, Kern County, the greatest oil well in the State. It is on the Shamrock property, and when sunk 2 years ago flowed about 800 bbls. of oil per day until "sanded." A few weeks ago it was fully opened, and is now yielding about 2,000 bbls. or 10 car-loads, a day, a record for California. Another well near by is flowing 500 bbls. daily.

The California Gold King Mines Company, operating at Picacho, San Diego County, is now treating about 300 tons of ore daily, and expects shortly to double the amount. It has spent about $400,000 in perfecting the plant, and is working a large body of low-grade ore, with 120 men busy, under Emerson Gee, superintendent. A number of Eastern men are interested. The mine is about 25 miles from Yuma, in a direct line.

The Southwest Miners' Association, of Los Angeles, which, as reported by local papers, has decided to dissolve, turns its collection of minerals, etc., over to the Los Angeles Chamber of Commerce. Lack of financial support is given as the reason of the dissolution, but was to have been expected. The only wonder is the association lasted so long. The California Miner's Association endeavored to form a Branch Association in Los Angeles several years ago, but found a sort of sectional jealousy against anything pertaining to Northern California, and a strong sentiment for an independent association. The practical advice of a San Francisco committee was ignored, and the Southwest Miners' Association organized a few weeks later. It was never a strong association, languished and was always short of funds for necessary work, leading a sort of hand-to-hand existence. There is not room in California for two miners' associations.

San Luis Potosi, Mex. March 10.

(*From Our Special Correspondent.*)

Oil is reported struck at Guadalupe, a suburb of the City of Mexico, by Senor Luis de la Barra, who has been drilling some six months. The hole was down 300 m. when there came a rush of mud, water and oil, demolishing the derrick, and shooting up, it is said, to a height of 300 ft. The well is still gushing, and still sending up its stream 100 ft. or more. As yet the flow of oil is not determined, but that skimmed off the water is clear, burning without smoke, and it is claimed that an analysis shows it to be 98 per cent petroleum. This well was struck at almost the exact spot where the Compania Exploradora de Anahuac, headed by E. N. Brown, vice-president and general manager of the Mexican National Railroad, was drilling a little over a year ago.

Word comes from the State of Oaxaca that La Natividad Mines, considered the largest silver and gold property in the Ocotlan District, have just been sold to a Canadian syndicate for $1,500,000. The transaction was made through Frank Peterson, the representative of the syndicate in Mexico, and the first payment of $100,000 has been made. Messrs. Thompson and Vickery, who purchased the Zapote Mine in the Taviche District, near Ocotlan, Oaxaca, for $400,000, gold, and the Carpenteria Mine for $40,000, now capitalized for $1,000,000 under the laws of West Virginia, as La Compania Minera Zapoteca, are in bonanza. William W. Thompson is the superintendent of these properties, and also of the Bismarck and Marie mines in the San Jose District, nearby, incorporated as La Compania Minera Latzu, in Iowa, with a capital of $1,000,000. These are among the first of the large companies that are going into Oaxaca, where a great number of small holders are developing many promising prospects. There is no doubt but that Oaxaca, and especially the Ocotlan District, offers many inducements to the legitimate promoter or to the mining man looking for a good investment. At present some well known Colorado and Utah men are looking around and gathering up some of the good things. From the southern part of the State, near Pochutla, James Kerr and associates have just returned, and report promising indications for oil at many places along the coast.

The Mexican Electric Light and Power Company is a new company, of Canadian capitalists, with Jas. Ross, of Montreal, as president, having $12,000,000 gold capital, of which $5,000,000 is already available. It is organized to utilize the power of the Necaxa, Tenango and Catepuxtla rivers, in the State of Puebla, for a large plant generating and transmitting power to the City of Mexico, 95 miles, and by a branch to Pachuca. The work is under the supervision of F. S. Pearson, the hydraulic and electrical engineer, who estimates that 40,000 h.p. can be obtained.

The standard gauge trains of the Mexican National Railroad reach San Luis Potosi to-day. This work of widening the National from narrow to standard gauge from Laredo to Soria, and from there on an entirely new road to the City of Mexico, is costing in the neighborhood of $10,000,000. But the shortening, by cutting out curves, driving tunnels, and the new line below Soria, will make a saving in time of about 24 hours between Laredo and Mexico City.

The Metallurgical Company, of Torreon, has increased its capital stock from $2,500,000 to $3,000,000, and will at once erect 2 new furnaces, bringing the capacity to 800 tons in 24 hours.

The first of the week exchange on New York was 261¼, but the improvement in the price of silver brought exchange to 260½ at the end of the week. The mining stock market is still very dull, but the properties remain in good condition and dividends are regular. The Monterey Iron and Steel was sought at $130, Cinco Lemores at $230, Hacienda de la Luz, Pachuca at $310, Lareta Marida de la Paz, Matehucla, at $740, Lareta Rosa, El Oro, at $160, and Esperanza y Anexas, El Oro, at $1,210.

London. March 6.

(*From Our Special Correspondent.*)

In the entire absence of business in South Africans or West Australians, the professional speculators have continued to turn their attention to Egyptian exploration companies. As I have already mentioned there is no information from a mining point of view that justifies any movement in the shares of such companies. Already we have been treated to a few new companies to take up concessions in Nubia and adjoining countries, but they are of no interest to mining men. I do not think these concessions are very dependable affairs, and in Egyptian territories there is no chance of obtaining concessions as the Government discourages for the present the wholesale exploitation by company promoters. The present movement in Egyptians on the Stock Exchange can hardly therefore develop into an important boom.

Another section of the mining market that is beginning to receive attention again is the copper department. Since the fall in price of copper, some time ago, little has been heard of copper shares. During the last few weeks, the gradual increase in the price of copper has set speculators considering whether the rise will be permanent and whether coper shares are worth trotting out once more. Among shares of this class that are now receiving attention are those of the Etruscan Copper Estates. It will be remembered that this company was formed two years ago to acquire and develop old mines in Italy. A short time after its flotation several eminent mining men looked into the property on behalf of people intending to take up shares or debentures, and they unanimously condemned it. In spite of this the directors went on with the work. For some time things were quiet, but during the past week or two the shares have once more become active and circulars vaguely expressed, but of sanguine nature, have been sent round. I understand that recent development work has not opened up any higher grade ore, the management hopes it will be able to treat the large bodies of low-grade ore on a paying scale. Shareholders and the public are quite sceptical as regards these hopes. The directors are naturally figuring on the increased price of copper, and expect thereby to secure the confidence once more of their shareholders. The general meeting will be held shortly, when a detailed statement is promised.

Another item of news in the copper market that has been received with interest is the proposed amalgamation of the Mount Lyell Mining and Railway Company with the North Mount Lyell Company. Some time ago the Mount Lyell absorbed some of its neighbors for the benefit of obtaining the fluxes on their properties, but the present proposition is a much more important one. The North Mount Lyell is a large producer, and sells its ore to the Mount Lyell for treatment. The scheme for amalgamation is not yet settled, and probably the North will raise several objections in order to gain advantages in the matter of terms. These mines were editorially referred to in the JOURNAL of December 27 last, and the advantages of a consolidation were then pointed out. Your readers will no doubt remember the Panuco Copper Company, which was floated in 1899 to acquire the mines in Coahuila, Mexico. After possession was obtained it was found there was no ore worth treating, so that it was decided to liquidate. The company was not a vulgar swindle of the usual type, but was brought out in good faith by the firm of Matheson & Co., of Rio Tinto, and the Mountain Copper fame. It appears that the official liquidator, after failing to sell the property, decided to work it on a small scale, and has since then made his expenses by sale of ore. A committee of inspection appointed by shareholders now consider it worth while to go on working, and propose to form a new company with one-tenth of the capital of the old one. They are endeavoring to get shareholders to subscribe further cash. No doubt the rise in the price of copper has influenced them in taking the step at the present time. I am doubtful, however, whether shareholders will respond.

Sydney, N. S. W. Feb. 3.

(*From Our Special Correspondent.*)

New South Wales.—The fire has again broken out in the Greta colliery, probably necessitating the mine being sealed again. At Tingha several parties are on very fair tin ore, but are somewhat hampered for want of water. Splendid returns are reported from the Silent Grove Company's tin lode near Torrington, which is regarded as one of the most remarkable discoveries yet made. From 80 tons of stone, 40 tons of tin ore have been crushed. The tin occurs there in greisen dikes. The Conrad silver-lead mine and the Conrad South Blocks have been amalgamated and floated as the Conrad Consolidated Mines, Limited, the object being to provide funds to erect smelting works on the spot for treating the stannite, the mine not getting full credit for this when selling to the custom works. The mines are situated at Howells, near Inverell, named after the managing director, Mr. John Howell, formerly general manager of the Broken Hill Proprietary Mine. After 4 months' idleness the Lloyd Smelting Works, at Lithgow, have started. The management of the Central Mine, Broken Hill, has decided to use the shaft of the New Broken Hill Extended, which will be stripped down to the required size. This is the deepest shaft on the Barrier, being down 1,352 ft. The manager of the Broken Hill Consols Mine has been instructed to close the mine, as the search for ore has been unsatisfactory, but other portions of the lease will be thoroughly prospected with diamond drills.

Among the many half yearly reports that have been issued during the past fortnight, that of the Broken Hill Proprietary is not the least. The gross product from the mine during the year was £1,197,131. Expenses came to £1,055,436, and depreciation to £39,000, leaving a profit of £103,000, equal to 8½ per cent on the value of the output. The total expenditure on the whole plant since the formation of the company comes to £1,279,869, and of this £834,504 has been written off for depreciation. The difference between the highest price of lead in 1900 and the present price meant a loss to the company of £360,000 per annum. Ten additional coke ovens have been completed at Bellambi, and 40 more are under construction. This plant when completed will have a capacity of 1,100 to 1,200 tons of coke per week. A large saving is made by the company, making its own coke. The Huntington-Herberlien process cost £13,283 to install. It is capable of treating 2,500 tons per week, and is found to be much more satisfactory than the old briquetting method of preparing the ore for the furnaces. During the past 5 years £102,000 has been spent in development, which is equal to 1s. per ton of ore raised. The output has increased about 1,000 tons per week over the preceding half year. For the last half year 334,709 tons of ore were raised, 290,378 tons of which passed through the concentrating plant. The extraction of ore from the open cut has practically reached its economical limit. An electric plant of 150 h.p. has been installed, partly to replace horse traction underground by electric motors. The lode has lately been cut in the cross-cut of the 1,000 level, which gives a much longer lease of life to the mine.

The directors of the Gallymont Gold-fields have recommended the winding up of the company on account of the unsatisfactory results from bulk crushings. Thus another fond hope of English capitalists dies a natural death. Rich gold continues to be found at Tucker's Hill, Hargraves. At Tibooburra, in the western part of N.S.W., Harry Rowlands found a 65¼-oz. nugget. At Baker's Creek Mine, Hillgrove, during the past half year, 2,228 tons were crushed for 3,435 oz. of gold, valued at £10,993, the stone averaging $30.80 per ton, an improvement of $3.90 on the average of the previous half year. A total of £3,950 was expended on exploratory work during the period.

Walkers Limited foundry, at Marybrough, Q., has lately completed what is thought to be the most powerful pair of hoisting engines ever made in Australia. The plant is for the Scottish Gympie Freehold Mining Company, and is capable of hauling 7½ tons from a

depth of 5,000 ft., at the rate of 2,000 ft. per minute, the indicated horse-power being 2,500.

GENERAL MINING NEWS.

Chesapeake & Ohio Railway Company.—The coal and coke shipments in January and the 7 months of the fiscal year beginning in August, were as follows, in short tons:

Coal:	January.	7 months.
New river	270,339	997,566
Kanawha	158,317	534,886
Kentucky	23,354	61,962
	452,010	1,594,414
From connections	20,004	106,438
Total coal	472,014	1,700,852
Total, 1902	497,785	3,324,983
Coke:		
New River	33,348	154,051
Kanawha	10,679	30,925
	44,027	184,976
From connections	32	2,266
Total coke	44,059	187,242
Total, 1902	45,903	276,607

Decreases are due chiefly to the smaller shipments to tidewater points.

Mineral Oil Exports.—The United States made the following exports in February: Crude oil, 8,907,616 gals.; naphthas, 628,844; illuminating, 48,053,801; lubricating and paraffin, 8,318,200; residuum, 58,800; total, 65,967,261 gals., as against 65,362,168 gals. in the same month last year. In the two months ending February 28 the exports amounted to 124,110,310 gals., which compares with 159,053,119 gals., showing a decrease of 34,942,809 gals., or 22 per cent. This reduction is due chiefly to the smaller demand for residuum and illuminating oil.

ARKANSAS.

JOHNSON COUNTY.

Arkansas Coal Company.—This company has been organized at Clarksville, and is capitalized at $25,000. The holdings of the Spadra Anthracite Mining and Mercantile Company, at Spadra, have been purchased, and the company proposes to develop the property. The officers are: J. W. Sallis, president; W. V. Hamilton, vice-president; A. N. Reagon, secretary; L. C. May, treasurer.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Company.—The production of the company's works at Clifton in January was 1,264 short tons of copper.

(*From Our Special Correspondent.*)

Del Cobre Consolidated.—This company is having its group of 15 claims, 12 miles east of Florence, surveyed.

Summit Group.—Ore is being shipped from these mines, near Metcalf, to the Arizona Copper Company's smelter at Clifton. The ore is said to run 21 per cent copper.

MARICOPA COUNTY.

(*From Our Special Correspondent.*)

Uncle Sam Copper Company.—The shaft on this company's mine, 30 miles southeast of Phoenix, is down 100 ft. A gasoline hoist will be put in. Sinking is to continue to 500 ft.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Cerbat.—This mine, at Cerbat, has been sold to E. T. Loy, of Chloride, for $10,000, with one-third down.

Handy.—This mine, at Silver Creek, is worked by the Gold Creek Mining Company, of Acme, and 2,500 ft. of work has been done. One shaft is down 225 ft. The company will erect a mill. I. N. Hawkins is superintendent.

Katherine.—The machinery for a new mill for ores from this and the New Comstock mines, near the Sheeptrail Mine, on the Colorado River, has been ordered. S. C. Bagg is manager.

Leland.—This company, near Acme, has a tunnel in 600 ft., and will erect a reduction plant.

Pinkham.—The Schee Brothers, of Santa Monica, Cal., who own this mine, near Chloride, will soon resume work. A reverberating furnace for roasting the ores may be put in.

YAVAPAI COUNTY.

(*From Our Special Correspondent.*)

Black Diamond Copper Mining Company.—This company is to sink a shaft 1,000 ft. at the mine in the Dragoon Mountains, near Pearce, to get sulphide ore. The new smelter is almost ready to blow in, and 1,000 tons of coke are contracted for.

Hidden Treasure.—At this mine at Turkey Creek, a steam hoist and 10-stamp mill are to be put in.

Hot Number.—This mine, in the Bradshaw Mountains, has a tunnel in 900 ft. The mine is owned by the Copper Cobre Mining Company. The progress made is 225 ft. a month, using machine drills. The ore carries gold, copper and silver, with some manganese. G. W. Middleton, of Prescott, is superintendent and manager.

Iron King.—The tramway at this mine, near Jerome, is completed, and the machinery for the smelter is being placed.

Oro Grande Exploration and Development Company.—This company, at Peralta Peak, is cross-cutting its ledge on its 50-ft. level. A contract will be let to run a tunnel on the ledge.

Storm Cloud.—E. A. Frank is operating a 2-stamp mill on ores from this mine on Turkey Creek.

CALIFORNIA.

AMADOR COUNTY.

(*From Our Special Correspondent.*)

Fremont Consolidated Gold Mining Company.—At this Amador City mine, C. E. Purrington is superintendent and Arthur Goodall secretary and manager. Work on the new mill is to start.

Kennedy Mining Company.—Work continues on the new mill at the East shaft of this company at Jackson. J. F. Parks is manager. Twenty stamps will soon be ready. Under present ownership this mine has yielded over $3,000,000.

South Eureka.—At this mine, at Sutter Creek, John Truscott superintendent, cross-cuts have been run 300 ft. east and west. The 2,300-ft. main shaft is to be sunk 100 ft. deeper.

BUTTE COUNTY.

(*From Our Special Correspondent.*)

Faul.—The dredging company which leased this land near Oroville, has filed a contract, made by A. F. Jones, W. P. Hammon and James H. Leggett, agreeing to give Mr. and Mrs. Faul 10 per cent of the gross proceeds and to return the land after dredging, with enough top soil to admit of its being plowed. The lessees also agree to pay $200 per acre damages for any land not left in condition for plowing.

Spring Valley.—The Pittsburg, Pa., owners of this mine at Cherokee, have sold their property to W. P. Lynch. There are 4,500 acres of land, including about 800 acres of mining ground.

CALAVERAS COUNTY.

(*From Our Special Correspondent.*)

Bernardi.—Thomas Rooney, of San Francisco, has begun work on this blue gravel mine at Mokelumne Hill, and is building roads to haul in machinery. Frank Bernardi is superintendent.

Easzy Bird.—This quartz mine, near Mokelumne Hill, R. Brown manager, is working 20 men. A ditch taking water from the Mokelumne River is being cleaned out, and it is reported that a 10-stamp mill will be built.

Maxcey.—This claim, near El Dorado, owned by C. E. Rigney, has started work with plenty of water.

Nebraska-California Mining Company.—This company has bonded the Nineteenth Century quartz mine, near Mokelumne Hill. The old ditch will be cleaned out and a pumping plant put in.

Wylie-Treat.—This gravel claim, near El Dorado, is being worked by Cuslidge Brothers, with 200 ins. of water.

INYO COUNTY.

(*From Our Special Correspondent.*)

Anthony.—The 5-stamp mill on this mine, at Ballarat, is running on high-grade ore.

Cecil R.—An 8-stamp mill is being put up by this company at Ballarat. Ore from the Santa Rosa Mine will first be crushed.

Dunphy.—At the old camp of Cerro Gordo, 9 miles from Keeler, the Troeger Brothers are sinking a shaft on this mine to strike the vein at 500 ft. They will also run a 700-ft. tunnel.

Union.—Machinery is being hauled by T. C. Boland to Cerro Gordo, near Keeler, for running a steam concentrator on the dumps of this mine.

KERN COUNTY.

(*From Our Special Correspondent.*)

Champion.—Work is to be resumed on this mine, near Woody, by Andrew Moore. The mine has been idle some years.

Polar Bear.—George W. King & Son have taken a lease on this mine at Isabella.

MARIPOSA COUNTY.

(*From Our Special Correspondent.*)

Coronado.—At this mine, owned by the Austin Group Mining Company, a steam hoist is being put in.

Kinsley District.—McCarthy & Soderburg intend adding 6 stamps to their 4-stamp mill. Hilliard & Thomas are taking out good rock near Marble Springs. The mill run on ore from the Dugan Mine, under bond to Weston, Patterson & Kinsley, showed values of over $20 per ton.

Le Grand Mining Company.—This company, of Stockton has elected the following officers: J. M. Davis, president; R. Bancroft, vice-president; L. G. Worden, treasurer, and J. G. Elliott, secretary. Machinery is to be put up as soon as enough stock is sold to make the payments.

Tramp.—This mine, at Whitlock, owned by James Helm and Clyde Czerny, is yielding handsome specimens.

NEVADA COUNTY.

(*From Our Special Correspondent.*)

Fairview Mining Company.—This company, at Minersville, Joseph Porter superintendent, has shipped a gold brick valued at $5,225 from the last clean-up.

Gold Tunnel.—This mine, at Nevada City, has started up after a short shut down. Development continues under Superintendent Eddie.

Red Cross.—The new 20-stamp mill of this mine, at Omega, is busy, and a good force of men is employed.

Sierra Queen.—At this mine, near Nevada City, 25 men are at work. A new compressor and a Johnson concentrator will be put in. The shaft is to be sunk 200 ft.

Standard.—Work has started on this mine at Grass Valley. Mason & Curtis have ordered a pumping and hoisting plant. A 20-stamp mill is to be put up.

PLACER COUNTY.

(*From Our Special Correspondent.*)

Crandall.—The 5-stamp mill at this mine, near Auburn, has started up under Superintendent Frank Hartley.

Gaylord.—The rich black sands of this mine, near Auburn, which have been running to waste, will hereafter be shipped to the Selby Smelting works.

Pine Hill.—At this mine, near Wolf, L. I. Ogden has installed a new 10-stamp mill.

SACRAMENTO COUNTY.

(*From Our Special Correspondent.*)

El Dorado Consolidated.—This mine (or Blue Ravine) has 75 men busy.

Red Canyon.—This drift mine, above Folsom, has 40 men at work.

TUOLUMNE COUNTY.

(*From Our Special Correspondent.*)

Cosmopolite.—In this mine, at Groveland, H. Argall, superintendent, drifting and cross-cutting are in progress.

Del Monte.—The building and hoist of this mine, near Groveland, have been destroyed by fire. The mine is under bond to the Sierra Mining Company.

Harvard.—At this mine, near Jamestown, T. C. Gorrie superintendent, 30 stamps are at work. Air drills will shortly be in operation with the 20-drill compressor. A large Dow pump is going in at the t. station.

Jumper.—During March the men at this mine, near Stent, Mark B. Kerr manager, will be filling in the stopes, which caved when the water was turned into the workings, to put out the recent fire. The full force will be at work by April 1.

Laura.—Work will at once start on this group, near Arrastraville, by the parties holding the bond.

Republican.—At this mine, near Jacksonville, 50 men are employed, and the 20-stamp mill is running on good rock.

Star.—This mine, at Pine Creek, has started up with a full force busy.

Sunnyside.—A 10-stamp mill has arrived at this mine, Charles A. Smith superintendent, near Groveland. The mill was made at the Llewellyn Iron Works, Los Angeles.

Vine.—It is expected that a new mill will shortly be put on this mine at Spring Hill, and the force increased.

COLORADO.

BOULDER COUNTY.

Mile High Mining and Milling Company.—This company recently purchased the Caryl Mine in Sugar Loaf District, and now owns the Wall Street Tunnel. Men are to unwater the Skandia group.

Nancy Mining Company.—The new mill is in operation. A considerable amount of ore has been blocked out. Drifting continues on the Last Chance vein.

Wall Street Mill.—This new chlorination mill is in operation.

Wood Mountain Company.—This company now has its shaft 150 ft. below the bed of Four Mile Creek and 950 ft. below the surface of Wood Mountain. The company is enlarging the mill and expects soon to be handling 75 tons per day under Superintendent Andregg's direction.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Banta-Hill Consolidated Mines Company.—At a stockholders' meeting on March 9, at Denver, it was voted to mortgage the property for $50,000 to clear the floating debt, and put the property in shape. All the old directors, except R. L. Martin, were changed.

Chicago-Carr.—Sinking has commenced at a depth of 430 ft. About 30 miners are at work, and regular shipments are made to the mills and sampling works. B. M. Myers, Central City, is in charge.

Mackey.—J. L. Mountz, of Apex, Colo., has shipped to the sampling works ores carrying values as high as $125 per ton from surface workings. The property was idle a number of years until sold to the present operator.

Progressive Mining and Investment Company.—This company, in which Denver and Leadville parties are interested, has a lease and bond on the West Wyandotte group in Russell District, and will take out the water. The company intends to install another boiler. W. L. Cooper, Continental Building, Denver, has charge. The group has a very fair record, and is surrounded by the Topeka, Mollie Newcomb, Alps and other producers.

Rialto and Vanderbilt.—Frank McGee, of Denver, has taken a lease and bond on these properties in the Central City District, for 18 months, and has interested Chicago parties, who will work extensively. The main shaft on the Rialto extension is 160 ft. deep, and will go deeper. The last milling ores ran 5 oz. gold per cord, and smelting ores from the tunnel workings have sold for $126 per ton. Joseph Hafer, of Central City, is the owner.

Sydenham Mining, Milling and Leasing Company.—Colorado parties have taken a lease and bond on the Maine and Hamlet claims, in Gregory District, and have begun work, with S. W. Brereton, Central City, as manager. The surface ores were among the richest in the county, top quartz ores going over 12 oz. gold per ton, while some smelting ores have been sold for $1 per pound. The main shaft is down 310 ft., with over 100 ft. of virgin ground.

Town Topics Gold Mining Company.—This company has declared its eighth dividend of ½c. a share, or $5,000. The company is operating the East Notaway group, employing about 50 men on the tributing system. During 1902 the smelting ores ran a little over $85 per ton, the product all going to the sampling works and to the valley smelters. M. D. Draper, Central City, is superintendent.

GUNNISON COUNTY.

Ashland Mining Company.—This company continues work on its long tunnel on the Carter group, near Ohio City. The ore values are in gold principally. The company is also sinking on a vein opened on a property lying above the tunnel.

Cortland.—This gold mine, in McIntyre Gulch, near Ohio City, will soon be equipped with machinery. Denver people are the principal owners.

Granite Mountain.—This gold mine, in Jones Gulch, near Ohio City, has been leased from Caufman & Wilson by the Rosalasa Mining Company, a Pittsburg, Pa., enterprise. During last year the Granite Mountain made some shipments to the Buena Vista smelters.

Maid of Athens.—This mine, near Pitkin, is said to have developed the largest ore-body yet opened in the district. The values are chiefly in silver.

Midland.—This mine, near Vulcan, is to resume work shortly, according to reports. A 1,500-ft. tunnel is to be driven.

Pitkin Gold Belt Mining Company.—This company has opened ore in the 235-ft. level. The vein produces mineral that assays from 2 to 9 oz. in gold and picked specimens run very high. The company last year equipped the property with a good plant of machinery and is now developing it. Galveston, Tex., people, headed by W. T. Stewart, are the principal stockholders.

Pittsburg-Gunnison Mining and Milling Company.—This company is pushing work on the Yukon tunnel, near Ohio City, which is now in about 500 ft. Some good ore has been opened, but not in shipping quantities yet.

Polaras.—This group, in the Gold Brick District, is being operated by a Pittsburg Company, with R. D. Stolles at its head. The company has driven a tunnel about 150 ft.

Teller.—This group in the Gold Brick District is said to show a nice body of ore in the 120-ft. shaft. The group is owned by William Friend and others of Pitkin.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Leadville Ore Shipments.—Tonnage figures have jumped to 2,500 tons daily. The Iron Silver Mining Company has increased shipments to 300 tons; the Home Mining Company to 150 tons, and the Caribou to 175 tons daily. Zinc sulphides also show a slight increase.

American Smelting and Refining Company.—The company's A. V. plant at Leadville is now running 6 furnaces and handling an immense tonnage. The 300-ton mill, to handle low grade sulphides, is about ready to start.

Caribou Mining Company.—The iron shoot is being opened, and shipments have increased to 150 tons daily.

Iron Silver Mining Company.—The new shaft, 1,700 ft. from the Moyer, is completed, and at 612 ft. a drift has been run to connect with the old Moyer workings. This drift, just completed, is 1,700 ft. long, and 1,400 ft. of it shows ore. The production has increased to 300 tons daily of good grade iron ore.

London.—At this Mosquito Range property a new tunnel started from South Mosquito to cut the vein 300 ft. below the old tunnel, has proved the vein very rich in gold. The vein had already been proven along the floor of the old tunnel for 2,800 ft., and this new ore is 1,000 ft. south.

New Leadville Home Mining Company.—After raising money a few months ago to push development and prospecting in new territory the company has opened a new iron shoot south of the old Penrose shaft, and will ship 200 tons a day. Ore has been stoped for 340 ft., and cross-cutting shows it 150 ft. wide. The iron material will average 28 oz. silver and 15 per cent excess, while occasional streaks of chlorides run up the values. Stoping and drifting is showing iron ore everywhere, and shipments will soon be 250 tons a day.

Valley Mining and Leasing Company.—After the directors' meeting in Springfield, Mass., President Vinton and Secretary-Treasurer Carpenter came to Leadville. Mr. Deane has been released as manager and J. H. Henley, late of the Elkton property, at Cripple Creek, is in charge. Work has been resumed. The shaft, now dow nover 300 ft., is to follow the ore shoot. Arrangements are being made to ship.

Yak Mining, Milling and Tunnel Company.—The tunnel is almost 2 miles long, and by April 1 will be completed to Ibex No. 4 workings, where it will connect with Ibex No. 4 shaft, with a drift at the greatest depth ever attained in that territory. Shipments are light at present.

OURAY COUNTY.

Continental American Gold Mining Company.—This company incorporated at Denver, with a capitalization of $2,500,000, is composed of New York men. It has bought a group of claims formerly owned by F. J. Hulanski, near the head of Corkscrew Gulch, 2 miles east of Ironton, for $100,000, on which a body of ore was recently opened. The ore is said to show values in gold, silver and copper. Two tunnels have been driven and a shaft sunk 120 ft., connecting the tunnels. Shipments will doubtless go to Durango.

SAN JUAN COUNTY.

(*From Our Special Correspondent.*)

German Oak Group.—This group of 14 claims on Galena Mountain, near Silverton, is being developed at great depth by the Benson Tunnel, which is now in 850 ft. The group is owned by Mrs. Kunte Benson, who also holds a bond on the Anti-Periodic, and will drive the tunnel to that property.

Gold King Consolidated.—February's record from the Gold King Mill is 2,856 oz. of gold bullion and 1,300 tons of concentrates, averaging $80 per ton. In January 1,500 tons of concentrates were shipped.

Hercules.—Work will soon be resumed on these properties, near Silverton, and the Little Dora Mill will be run at full capacity. About 150 men will be put on at first.

Kendrick-Gelder Smelting Company.—Notices have been issued for a special meeting of the stockholders March 25, at the general offices in Denver, to consider the proposed consolidation of this company with the Oliver Reduction Company and the Paradox Gold-Copper Mining Company.

Ruby Basin Mines.—The Jay vein has been cut, and is said to show an average of $29 gold per ton. The ground is soft, requiring constant timbering.

Scotia.—A rich strike is reported from the Scotia on the upper Animas River in an entirely new district. The vein is several feet in width, and carries a streak of high-grade gold ore.

Stony Pass Mining Company.—This company recently paid to Jackson & Driscoll, the final payment on the Lead Carbonate group on Lost Mountain, near Silverton. The tunnel to intersect the vein is in 750 ft., and will be driven with 3 shifts as soon as the roads are opened.

Treasury Tunnel Mining and Reduction Company.—This Silverton company recently secured a decision in the State Supreme Court from Du Praw & Bros., who sought to restrain the company from driving its tunnel through the Corncob claim.

SUMMIT COUNTY.

Colorado & Wyoming Development Company.—This company has started drifts on the vein struck in the tunnel at 620 ft., and will ship the silver-lead ore to the Breckenridge Sampler. For each ton of smelting ore mined at present about 3 tons of concentrating ore are broken. This is saved for treatment during the summer.

Hamilton.—This property, near Breckenridge, will have a 20-stamp and concentration plant running this summer.

Puzzle and Puzzle Extension.—These properties are hauling ore to the West Side concentrating mill at Breckenridge. The mill and mines are operated by Hoyle & Hoyle, who have 10 men at work in the mines.

Victoria.—This mine at Frisco is said to have a fine body of iron sulphide ore carrying from 1 to 2 oz. in gold per ton, besides silver and iron values. The property was sold in January by Lars Matson to Messrs. Stewart, Crawford and Alliund for $25,000.

Whale.—This old mine, in Hall Valley, near Swandyke, is said to have opened a foot of high-grade silver ore in the tunnel 1,500 ft. from the mouth. The mine is working about 10 men. It is above timber line, and will not ship before the snow goes off.

TELLER COUNTY—CLIPPLE CREEK.

Strike Situation at Cripple Creek.—President Moyer, of the Western Federation of Miners, on March 17 refused the offer of the United States Reduction and Refining Company to have Chief Justice Campbell or a man named by Governor Peabody investigate the strike at the company's mill at Colorado City, with a view to arbitration, and ordered out 600 miners employed on Stratton's Independence, the Hull City Placer, Granite, and Findley mines, all of which ship to the Standard Mill.

(*From Our Special Correspondent.*)

Strike Situation.—It looks as if there were still a chance for the miners of this district to go out. The men have no grievance, and if they go out will do so from sympathy with the striking mill men at Colorado City. At present a number of business men and Governor Peabody are trying to arrange for arbitration.

Cripple Creek Enterprise Gold Mining Company.—The shaft at the corner of Myers Avenue and Fourth is down about 200 ft. The company, of which Dan Hanly is manager, has a 20 years' lease under the streets and alleys of Cripple Creek, and also own a number of lots. While no ore has yet been found, from all appearances there is a good chance to open some.

TREMONT COUNTY.

Rocky Mountain Smelting Company.—This company, owning the Rocky Mountain Smelter in Florence, recently made an assignment, conveying all its property wherever situated to E. L. Whitney, of Colorado Springs, who was former secretary of the company. The assignment was made for the benefit of the creditors. The company unsuccessfully operated its plant for several years, and for the last year the plant has been idle entirely. The stockholders are Iowa farmers.

GEORGIA.

FLOYD COUNTY.

Bauxite Mines.—The bauxite mines, near Cave Springs, which have been closed during the winter, are to start work again. The output is mostly shipped to Pennsylvania, where it is made into alum and aluminum.

LUMPKIN COUNTY.

North Georgia Gold Company.—This company has been organized to operate mines and to do a custom milling and smelting business. The office is at Gainesville, and the incorporators are Edward W. Axson, J. H. Clayton and J. M. Proctor, all of that town.

IDAHO.

ELMORE COUNTY.

Ella Hill Gold Mining Company.—A. H. and Ernest Godbe, of Salt Lake, Utah, have taken an option on this company's holdings in Neal District.

IDAHO COUNTY.

Crackerjack.—A new ledge of gold ore, 5 ft. wide, is reported cut in the tunnel of this Buffalo Hump mine, 180 ft. below present workings.

OWYHEE COUNTY.

Banner.—J. E. Mosher, of San Francisco, has bonded this group of claims on Florida Mountain, near Silver City. The property was recently examined by H. W. Rees.

SHOSHONE COUNTY.

Last Chance Mining Company.—The Spokane & Eastern Trust Company, of Spokane, has started a suit against this company and the Empire State-Idaho Mining and Development Company to foreclose a mortgage which will aggregate about $500,000. The Empire State-Idaho Company is the principal bondholder. The complaint says the suit is to recover $393,000 as principal; $102,686, aggregate of unpaid coupons originally attached to the bonds; for interest after January 2, 1902, at 6 per cent; interest on some of the bonds from the time they became due, at 7 per cent, and attorney's fees and other expenses, amounting to from $5,000 to $15,000. This mortgage was issued on January 2, 1902. It is said that the prime losers by the foreclosure of the mortgage would be the stockholders of the Last Chance Company, for unless they should unite to protect the bonds at the com-

ing sheriff's sale, their stock will be wiped off the market. The foreclosure of the mortgage would give the properties outright to the Empire State-Idaho Company.

LOUISIANA.

CALCASIEU PARISH.

(From Our Special Correspondent.)

Mermenteau Oil Company.—This company, capitalized at $200,000, H. Ackerman manager, is drilling near Lake Arthur.

Metropolitan Oil Company.—No. 1 on the Conover tract, near Welch, is down 800 ft.

Southwestern Oil Company.—The No. 1 well, at Welch, is in and proves to be a good pumper. Another well will be drilled at once.

MICHIGAN.

COPPER—ONTONAGON COUNTY.

Mass Consolidated.—At the annual meeting in Boston, Mass., on March 12, W. T. Fitzgerald, F. R. Tibbitts and H. E. Bolles were appointed a committee to examine into the financial condition of the company. The following directors were elected: W. H. Bailey, Charles H. Bennett, Ben. T. Cable, J. Walter Davis, F. W. Hunton, Charles A. Lamb, C. F. Lynde, J. M. Wilcox and George A. W. Dodge. Of these, W. H. Bailey, George A. W. Dodge, C. F. Lynde and J. M. Wilcox succeed Fred. H. Begole, David W. Farquhar, A. B. Turner and S. D. Whittemore. Treasurer Bancroft submitted a statement under date of March 12 showing assets of $271,535 and liabilities of $188,086. It was stated that it had cost the company 14c. per lb. to mine copper, which had been sold at 12c.

IRON—GOGEBIC RANGE.

Palms.—This mine, near Bessemer, is leased by the Dunn Iron Mining Company. The mine closed in July, 1901, but one shaft is expected to ship ore this season a drift from the Anvil Mine, having cut a fair sized lens on the Palms. J. R. Thompson, of Ironwood, is superintendent.

IRON—MARQUETTE RANGE.

The stock piles at the mines about Ishpeming are the largest that have ever accumulated from a single winter's work. A number of the mines have been shipping to the various furnaces throughout the winter.

Republic.—The surface works of this mine at Republic are being overhauled and improved. Some of the present hoisting plants will be abandoned, and work concentrated at others. The Allis engine house is to have a new hoist, with 2 first-motion drums. It will hoist ore from the Pasco shaft, which is to have 2 skip roads. Two new 350-h.p. compressors will be installed at the water power station. At No. 5 engine house 2 Babcock & Wilcox boilers will be put in, the only boilers of this type on this part of the range. The work now done at the Ely engine house will be done from the Allis, and No. 8 engine house will be closed after the steam pumps are replaced by electric pumps. A 100-h.p. dynamo, for the pump and for lighting, will be put in.

MINNESOTA.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

The United States Geological Survey's monograph of the Mesabi Range is now ready for distribution. It is a volume of about 450 pages, and has a map of the range from Birch Lake, in T. 60, R. 10, to west of Grand Rapids, on the Mississippi River, in T. 55, R. 27. Single copies of the map unfolded can be had by sending price to C. K. Leith, Madison, Wis.

In one exploration on the range good ore has just been found under 150 ft. of hard and hungry looking ferruginous chert, locally called taconite.

Boulder Iron Company.—This company, exploring in section 31, T. 59, R. 18, has uncovered a little ore. It is also exploring in section 27, T. 59, R. 14, and is well pleased at the outlook, ore of good quality showing deeper than the thin skin heretofore found. This company has taken over the exploration for ore conducted by A. Merritt in section 2, T. 58, R. 16, south of the village of Biwabik, where at considerable depth ore has been found in one hole. The extent of none of these finds is yet known.

Croxton.—This property is to be stripped the coming season, a contract having been let some time ago. The present stripping will be for about 20 acres. The mine has been explored to show very much more ore than was known when the present company took hold, and is now a large and valuable property. It is stock piling for early shipment.

Higgins.—A contract has been let by the Minnesota Iron Company for stripping of 500,000 cu. yd. from this ore-body, which was explored the past summer. It is in the s. half of the n. w. quarter of section 4, T. 58, R. 17, and is a large ore-body of good grade. It is a leased proposition, with the fee in the Higgins estate, and Giles Gilbert, of Duluth, and a half interest in the mining company, through the Rockefeller concern.

Leonard Iron Company.—This new company is preparing for stripping, and is sinking a shaft for milling operations.

Lincoln.—This, the leading Mesabi Range property of Jones & Laughlin, is now working heavily in anticipation of a large output, and has about 100,000 tons in stock. The company will open the ore-body by a new shaft, which has been sunk in rock 200 ft. from the deposit, and is now being connected. About 400 men will be employed as soon as this shaft is ready.

Stephens.—This mine of the Minnesota Iron Company, which has been under development for 2 years, will ship heavily this year. Two locomotives and 3 shovels are busy stripping, and a large area has been opened. The surface equipment is of the very best character. The ore-body is very large. It was considered low grade when taken by the Oliver Iron Mining Company, but the mine is destined to be one of the most important on the range. Its ore is physically perfect, and the cost of mining will be the minimum. It lies in section 26, T. 59, R. 15, about 5 miles east of the Biwabik group, and close to the Little Mesabi Lake.

Tesora.—M. L. Fay and W. C. Yawkey are to open this mine, in the n. e. quarter of section 4, T. 58, R. 17, where they have been exploring for some time.

Troy.—The shaft will be 160 ft. deep, giving a 60-ft. level in ore. Some ore is coming up and developments will be pushed for a large output this year. The mine contains a good quality of ore, though it is classed as a small property. It will ship to the Buffalo Steel Company.

MISSOURI.

JASPER COUNTY.

Tennessee Mining Company.—This company's property, at Chitwood, owned by A. P. Ford, of Dyersburg, Tenn., was purchased recently by Bruner & Hedrick, of Kansas City, for $50,000. The negotiations were conducted by J. E. Tedford, of Joplin. The property consists of 14 lots. The new owners will equip the property with the latest machinery, and as soon as possible will run double shifts.

MONTANA.

DEER LODGE COUNTY.

(From Our Special Correspondent.)

Atlantic Cable.—A 65-lb. bar of gold bullion is the result from the first run from the mill. The bar is worth $18,557, and was won from 450 tons of ore. The old Cable was opened in 1866, the first famous gold quartz mine opened in Montana. The specimens taken out by the original owner, Salton Cameron, have been exhibited the country over. The property had not been worked for 15 years, when last November a lease was secured by Judge F. W. Bacorn, who unwatered the mine and has it again in producing shape. The mine is in limestone, the ore being free milling. The saving by amalgamation is fully 90 per cent of the value. The property is about 18 miles from Anaconda. H. C. Bacorn is superintendent.

GALLATIN COUNTY.

(From Our Special Correspondent.)

Chestnut Coal Mines.—On March 6 a fire broke out in room No. 59, no doubt of incendiary origin. The mines at Chestnut belong to the Northern Pacific Railway, which recently improved the property to the extent of $100,000. The company has offered $500 reward for the apprehension of the party who started the fire.

GRANITE COUNTY.

(From Our Special Correspondent.)

Sunday.—The Montana Gold Mining Company, which is operating this property, is making weekly shipments of bullion to the Helena Assay Office. This week's bar weighed 126 oz., from 7 days' run of a 3-ft. Huntington Mill. The property is 5 miles from Princeton, near the old Royal Gold Mine, which was quite a profitable producer a few years ago.

MADISON COUNTY.

(From Our Special Correspondent.)

Bismarck Nugget Gulch Mining Company.—Five cars of machinery have arrived for the new works at Brandon, 4 miles from Sheridan. General Manager L. D. McCall, now in Chicago, is expected to return by the time the machinery is on the ground.

Boss Tweed-Clipper.—All the miners have been laid off, except pump men. No reason has been given by the company, and the suspension is thought to be only temporary.

Tanner Gold and Gem Mining Company.—This company has been organized with $150,000 capital to operate the Pole Creek placer mines belonging to A. W. Tanner, of Red Bluff, who has owned the ground for 20 years. Spinels and sapphires are found in the gravel, and are easily recovered from the sluice boxes with what gold and black sand gets in the flume. A. W. Tanner, of Red Bluff, is Montana agent.

PARK COUNTY.

(From Our Special Correspondent.)

Kimberly-Montana Gold Mining Company.—This company, under the management of John M. Mordock, has taken over the control of the assets of the old Bear Gulch Gold Mining Company at Jardine. Alex. Livingston as receiver of the latter company rendered his final report to the court sitting at Livingston on March 10, receiving his discharge. The new company will probably build 2 cyanide plants, a large one near the 40-stamp Revenue Mill, owned by the Consolidated Company, and a smaller one down the gulch below the tailings impounded from the working of the old 20-stamp mill of the Bear Gulch Company. Francis L. Bosqui has returned to Jardine to construct the cyanide plants. The new company has a capitalization of 3,000,000 shares of $1 each. The directors are P. L. Kimberly, William H. Barnaby, John H. Thompson, Moise Dreyfus, H. M. Ryan, Samuel Deutsch and Miles Finlan.

Montana Coal and Coke Company.—This concern, at Horr, under the management of H. C. Merry, formerly of Virginia, is opening the coal measures on the east side of the Yellowstone River, opposite the coke plant.

POWELL COUNTY.

(From Our Special Correspondent.)

Gladstone Mining Company.—The 10-stamp cyanide mill erected last season on Gold Creek, near the old placer camp of Pioneer, is offered for sale, without ever having turned a wheel. It was found after the mill was built that no ore was to be had from the company's mines for it.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

Speculator.—On March 6 the State Supreme Court dissolved the injunction which had been running for nearly 9 months against this company in the case of Lee Mantle vs. Speculator. Mantle claims $1,500,000 from the property on the plea of having a 1-16 interest, claiming that Patrick Largey held such an interest for him as far back as 1884. Mantle took no legal steps to secure the interest until 1893, Largey disavowing any trust relation. Mantle brought suit to enforce the trust, and the suit is still pending. Largey was killed some 5 years ago. Some nine months ago Mantle succeeded in closing the mine by the injunction, no wdissolved.

OREGON.

BAKER COUNTY.

Alamo.—Superintendent James McGuigan, of this mine, near Sumpter, has announced that a 40-stamp mill is to be ordered soon.

Virtue.—This mine, near Baker City, is owned by a syndicate of Canadians. Recently the Consolidated Virtue Mine, an adjoining property, which covers a parallel vein, was purchased for $40,000. Upon this new acquisition a 2-compartment shaft is being sunk, which will become the main workings. Arthur Buckbee is manager.

GRANT COUNTY.

Buckhorn.—This group of 8 claims has been taken up by a company known as the New York & Oregon Gold Mines Company. On the Silver Friend a tunnel has been run 165 ft., showing a 4-ft. vein of gold ore.

Red Boy.—Work at this mine, near Granite, is confined to sinking the main shaft. Only enough ore is being raised to run 5 stamps. The shaft is to go 500 ft. deeper. The company is constructing a dam over 50 ft. high at Olive Lake. When completed an electric power plant will be used to furnish power for the operation of the Red Boy and other propositions, including a trolley line system between Baker City and some of the nearby mines.

PENNSYLVANIA.

ANTHRACITE COAL.

Connell Anthracite Mining Company.—This company recently bought the coal lands of the State Line & Sullivan Railroad Company in the Bernice region of Sullivan County, and will develop the property with $550,000 capital. W. L. Connell, of Scranton, is president and general manager of the company; J. S. McNulty is secretary and treasurer. The stockholders are William Connell, W. L. Connell, Dr. A. J. Connell, James L. Connell, Ezra H. Ripple, J. S. McNulty, John Gibbons, John R. Williams, Edward S. Jones, Cyrus D. Jones, S. E. Wayland, of Scranton: S. T. McCormack, of Williamsport; W. W. Jackson, of Dushore, and J. S. Robinson, of Media. The tract comprises 5,000 acres. There is one colliery on the tract at Bernice. This is part of the purchase. The new company will remodel and improve this colliery and build another colliery of large dimensions and modern equipment at the Lopez end of the tract. The seam of coal varies in thickness from 3½ to 8 ft. The State Line & Sullivan Railroad runs through the tract 5 miles, and connects with the Harvey's Lake branch of the Lehigh Valley. Two other coal companies operate in this region. One

is the North American Coal Company, a Scranton concern, and the other the Gunton Coal Company.

Mineral Springs Breaker.—The Lehigh Valley Coal Company is about to start this new breaker near Parsons, which will employ 150 men and boys, and will have a capacity of 2,000 tons daily. From the ground to the topmost roof is over 200 ft. Large cast iron pillars replace the old wood beams. Spiral pickers, to reduce the number of breaker boys, and jigs are in place, and part of the building will be used as a washery..

BITUMINOUS COAL.

Coal Miners' Wages.—In the Irwin District the miners recently received an advance of 10c. per ton, to date from April 1, making the new rate 75c. per ton over a ¾-in. screen. An advance of 15½ per cent was given to machine hands, and to laborers about the collieries. There are said to be 20,000 men in the district, of whom less than 1,000 are connected with the United Mine Workers. In the Pittsburg District punching machine miners in the thin vein receive an increase of 13.87 per cent, and in the thick vein 16.87 per cent. Chain miners in the thin vein will get a 15.09 per cent increase, and in the thick vein 18.09 per cent. Drivers, cagers and trip riders get an increase of 22 per cent, or $2.56 per day, and all other labor an advance of 12½ per cent.

Bessemer Coal and Coke Company.—This company, with headquarters in Cleveland, O., has been organized with a capital of $500,000, and has purchased 2,000 acres of coal land, on which a shaft is being put down. The officers are: President, Col. James F. Branch, New York City; vice-president and general manager, C. J. Brokenshire; secretary, E. M. Love; treasurer, J. C. Trask. The land is situated on the Bessemer Railroad, 18 miles from Pittsburg.

Clark Coal and Coke Company.—This company, with $300,000 capital stock, will do a coal mining and fire-clay business near Freeport on the Butler branch of the West Penn Railroad. C. B. Clark, of Pittsburg, is president, and W. B. Horner is secretary and treasurer. The other incorporators are Frank McCann, John C. Slack, Thomas W. Welsh, Jr., C. E. Willock and L. B. D. Reese. Over 2,000 acres of coal land have been purchased, and work has started making entries.

Cramer Coal and Coke Company.—This company, of Johnstown, Pa., recently elected the following directors: Joseph Cramer, John Thomas, William Thomas, James Thomas and Thomas Cramer. The directors elected these officers: Joseph Cramer, president: John Thomas, vice-president; Warren Thomas, secretary; William Thomas, treasurer. The coal has been leased to the Johnstown Coal Company. The mines are situated near Cramer.

Stony Creek Coal and Coke Company.—This company, which recently bought the Bethel Coal Co.'s property, near Holsopple, is now mining 250 tons daily, but is working on plans to open mines with a capacity of 2,500 tons daily. The company controls about 3,000 acres of land. The officers are: President, V. H. Youngman; vice-president, F. H. Leonard; treasurer, Henry V. Youngman; general manager, W. H. Morris. The four gentlemen named, with Sheridan P. Zimmerman, are directors, with Mr. Zimmerman as resident director.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Black Hills Mineral Paint Company.—The ochre mill in Custer is soon to start, after a long idleness. George Phillips, of Custer, is in charge.

Clara Belle Mining Company.—New machinery has been ordered for the main shaft.

Dakota Mining and Milling Company.—The bond held by F. W. Bradley, of the Bunker Hill & Sullivan Mining Company, and associates, has expired, and the deal is off. The cyanide mill is not running full capacity.

Hidden Fortune Gold Miinng Company.—At the annual meeting in Denver, Colo., A. M. Stevenson, H. J. Mayham, George D. Begole and Herbert S. Shaw, of Denver; George M. Nix, of Lead; Otto P. Th. Grantz, of Deadwood, and T. J. Steele, H. P. Allison and George McCloskey, of Sioux City, Ia., were elected directors.

Provo.—J. N. Wright has awarded a contract to sink a shaft on this ground, recently purchased of Wilbur Todd and N. Smith.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Columbus Consolidated Gold Mining Company.—The shaft is 300 ft. deep. The cyanide mill at Blacktail is running again.

Dakota Mining Company.—The tankage is to be doubled at the cyanide mill. An addition will be made to the mill building.

Golden Reward.—The mines have resumed after a short shut down incident to the walk-out of smelter men in Deadwood. The smelting ore is shipped to Denver under contract with the American Smelting and Refining Company, and the Golden Reward management asserts that the Deadwood Smelter will not start again, as owing to the high price of coke a greater profit can be had by shipping. The mines are working at normal capacity, and are supplying the 250-ton cyanide plant at Deadwood, which has been running continuously. About 150 smelter men are out of employment. Harris Franklin, manager, says he had contemplated closing the smelter for several months.

Horseshoe Mining Company.—All work is suspended, awaiting the action of the stockholders on a proposition to reduce the capitalization from $10,000,000 to $6,000,000 by the cancelation of 4,000,000 shares of pooled stock. It is also proposed to issue $600,000 in 7 per cent bonds to carry out development plans.

Imperial Mining Company.—An additional set of rolls has been placed in the cyanide plant, and still another set and several new vats are expected. The company has been given the contract to treat ore accumulated by the Horseshoe Mining Company.

Rossiter Cyanide Plant.—The plant is running on ore from the Burton and Big Bonanza mines, working under lease to John Lundberg, and the Clinton Mine, leased to Henry Schnitzel, but owned by T. W. Thompson, of Whitewood, and S. R. Thompson, of Deadwood.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Bullion.—F. H. Long, of Chicago, associated with Chicago and Boston men, has purchased the property and contracts have been let for extensive work. The 5 claims adjoin the territory of the Holy Terror Mining Company, and are said to have large deposits of low-grade refractory ore. Mr. Long owns an electro-cyanide plant at Mystic and expects to reduce his ore there.

Columbia Gold Mining and Milling Company.—A new steam hoist, air compressor, air drills and electric lighting plant have been purchased, and are being installed at the mine in Rochford. The company has been working with a leased plant.

Oriole.—Rich ore is reported struck by the owners, John Forsythe and Frank March. The ore contains free gold and sylvanite, and is said to be richest found in the southern Black Hills since the Holy Terror strike.

TENNESSEE.

CUMBERLAND COUNTY.

Chicago-Tennessee Coal and Coke Company.—This company, whose mines are 18 miles east of Crossville, is to have a post office known as Waldensia. The mines will be equipped with modern machinery.

SCOTT COUNTY.

Cumberland Coal and Coke Company.—The chancellor decreed in the receivership proceedings that the company's business be wound up. Temporary Receiver J. N. Baker is retained. Assets of $1,000,000 are involved. Mrs. Niedringhaus, of St. Louis, Mo., holds over $500,000 in purchase money liens on lands which she sold to the company.

TEXAS.

HARDIN COUNTY.

(From Our Special Correspondent.)

Sour Lake Springs Oil Field.—Contractor Crosbie has brought in the Davey well, near Rodgers Hotel, adding new proven territory to the south and east. The flow is estimated at 5,000 bbls. daily, but the estimate is probably 50 per cent too much. Delivery of oil to the Guffey pipe line immediately started.

Roche No. 1, which was a producer at 530 ft., has been sunk to 1,200 ft., and the production greatly increased. Bad roads greatly hamper development of the field, and the construction of tankage. Thirty cents per bbl. has been offered for the output of several wells, but owners are not disposed to accept so much below Beaumont price, and a large advance is expected soon.

Central Asphalt and Refining Company.—This company having a refinery at Port Neches, 10 miles from Beaumont, has contracted for a well to be drilled on its property.

Gladys City Oil Company.—This Beaumont Company recently lost several tanks and 2 derricks by a fire on Block 21. The fire was fortunately stopped before it spread to the surrounding property.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Beaumont Oil Field.—Contractor O'Neill brought in a new well on the Yellow Pine tract, and Contractor Farish a new one on the Keith-Ward tract. The latter is said to be doing 400 bbls. daily.

Applications for receivers have been made for the following companies: Trenton Rock Oil Company, Consumers Oil and Pipe Line Company, Sac. Oil and Pipe Line Company, Kaltenbach Oil Company and Geyser Oil Company.

About $400,000 are tied up on the hill at Beaumont in compressed air plants that have proved useless for pumping oil under present conditions. Some of the plants were profitable 6 months ago, but those lately installed did not earn a dollar. Practical oil men had no faith in their successful operation, and these predictions have been accurate. The oil companies bitterly oppose the bill introduced in the Texas Legislature imposing a tax of 2 per cent upon the gross receipts of all oil companies, and intend to fight it at Austin. Oil shipments in February totaled about 900,000 bbls., and prices stiffened from 55c. in tanks to 65c. in tanks or 68c. to 70c., f. o. b. cars. Each month for the past six months has brought a steady advance, which will cease when crude reaches its refining value in the very near future.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—The Salt Lake banks report settlements for the week ending March 13, 1903, as follows: American Smelting and Refining Company, bullion, $186,600; gold, silver, lead and copper ores, $168,200; gold bars, $108,200; total, $463,000.

BEAVER COUNTY.

(From Our Special Correspondent.)

Blackbird.—Manager True says that sinking will be resumed at once.

Blue Acre.—The shaft is in ore which shows 11.6 per cent copper, 7 oz. silver and from $3.50 to $10 gold per ton.

Cactus.—Power drills will soon be at work on the long tunnel.

Cave Mining Company.—Shipments are suspended pending the improvement of the roads.

Horn Silver.—The shipment from this property, near Frisco, for the week ending March 13 was 5 cars of ore.

JUAB COUNTY.

Daly-Judge.—The annual report shows that 50,000 shares of treasury stock were sold for $150,000. Later 168,916 shares more were sold for $745,917, making the total revenue from this source $895,917. From the sale of ore $22,877 was received, while the interest account brought the company $6,938, making the company's total revenue amount to $925,732. On January 1, 1903, there remained in the treasury $75,046. There were spent for mine operation, including prospecting, $44,758; for mill operation, ore and general expense, $56,593, and for mine and mill construction, general improvements, etc., $30,632. The purchase of the Anchor property and other mining claims cost $757,761. President Daly estimates fully 120,000 tons of ore ready for mining and reduction.

(From Our Special Correspondent.)

Tintic Shipments.—For the week ending March 13 the samplers report the following receipts: Mammoth, 9 cars; Gemini, 12 cars; Bullion-Beck, 3 cars; Carisa, 1 car; Eagle & Blue Bell, 2 cars; Martha Washington, 1 car; Grand Central, 19 cars; Uncle Sam, 6 cars; Victor, 3 cars; Ajax, 2 cars.

Alaska Mining Company.—An assessment of 3c. a share has been levied to clean up indebtedness and explore the property.

Carisa.—E. M. Binford has been appointed superintendent of this Tintic property. Ben Jamison, the former superintendent, will give his time to personal interests.

Centennial-Eureka.—A cave-in which occurred during the week was thought to be of importance, but latest advices say it has not interfered with ore extraction in the least.

Emerald.—A new 60-h.p. boiler has been purchased.

Mammoth Mining Company.—The annual report gives the proceeds from sale of ores, bullion and concentrates for the year as $310,477. Superintendent Samuel McIntyre, Jr., in his report, says 3,949 ft. of development were done.

Uncle Sam Mining Company.—Large amounts of second-grade ores will be moved as soon as concessions are had from the railroads. The ore is too high grade to go under the $1.50 tariff, and not high enough to ship under the $2.50 tariff.

Victor-Boss Tweed.—The consolidation of these two mines is completed. The new company has 750,000 shares of 50c. par value. E. V. McCune is president; H. P. Henderson vice-president, and J. A. Groesbeck, Jr., secretary.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Consolidated Smelter.—During the week ending March 13, 186,000 lbs. of copper cullion were sent East.

Dalton & Lark.—The long tunnel has reached the 5,500-ft. station.

Highland Boy Smelter.—A total of 240,000 lbs. of copper bullion was sent East to the refineries during the week ending March 13.

The Highland Boy has contracted with the Ameri-

can Smelting and Refining Company for smelting its lead ores.

United States Smelter.—The product for the week ending March 13, was 184,841 lbs. of copper bullion, forwarded to eastern refineries.

(*From Our Special Correspondent.*)

Park City Shipments.—For the week ending March 13 the MacKintosh Sampler reports: Daly West, 4,004,890 lbs. ore; California, 113,060 lbs. of ore; Silver King, 2,100,000 lbs. of ore (approximate).

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Deep Creek District.—Efforts are being made to have the State Legislature expend $5,000 on a serviceable wagon road to this district.

Galena.—Heavy roads make ore hauling to Oasis, the loading station, difficult.

Ophir Hill Mining Company.—During the winter Senator Clark has spent $50,000 on electrical plants. Development has also been pushed and is said to show larger and higher grade bodies than ever before.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

Comstock-La Fleur.—The lessees are taking out some high-grade copper ore, 30 ft. north of the old workings.

Lone Pine-Surprise.—Two shifts are employed breaking ore in the Lone Pine stopes for shipment to the Crofton, B. C., Smelter.

Lucille Dreyfus.—Machinery is being installed. Over 2,000 tons of ore were excavated in cutting out the station.

North San Poil.—Drifting continues north and south on the 100-ft. level. Two car-loads of ore are ready for shipment.

Quilp.—Shipments of ore are temporarily suspended, owing to the coal strike at Fernie, B. C., but work continues actively in the mine.

STEVENS COUNTY.

United States Marble Company.—This Spokane company recently shipped a car-load of marble from its quarries near Valley to be used in the interior decoration of a large office building in New York City.

WEST VIRGINIA.

BARBOUR COUNTY.

Cleveland & West Virginia Coal Company.—This company, in which several Cleveland men are interested, has secured 1,600 acres of coal lands at the junction of Tygarts Valley and Middle Fork Rivers. The company will establish headquarters at Morgantown, and expects to begin operations soon. The directors are Edward G. Gilbert, L. F. McGrath, F. L. Wingate, J. E. Stewart and G. S. Beckwith.

FAYETTE COUNTY.

Boomer Coal and Coke Company.—The Kanawha & Hocking Coal and Coke Company has secured this coal operation in the Kanawha field. The price is said to be about $800,000.

Dietz & Fayette Coal Company.—This company, of Thurmond, recently purchased of a Baltimore syndicate, of which Charles Tyler is the head, 30,000 acres of valuable coal lands near the mouth of the Gauley River, and will begin work this spring. The price paid was $50 per acre.

Gauley Coal Land Company.—This company has been incorporated under the laws of West Virginia, with a capital of $3,432,000. It owns 175,000 acres of coal and timber land, and steps are being taken to develop this coal at once. Henry L. Higginson, of Boston, Mass., is president of the new company.

MINGO COUNTY.

Pittsburg & Tidewater Coal Company.—New York City and Pittsburg men have organized this company, with a capital stock of $1,500,000. The company will take over 24,000 acres of land near Dingess, on which 5 mines are in operation. The company will have offices at Pittsburg. The officers are: President, Edwin Ripley, of Sherman, N. Y.; vice-president, C. K. Totten, of Pittsburg; treasurer, C. Parker, of New York City; secretary, H. D. Gamble, of Pittsburg.

MONONGALIA COUNTY.

West Virginia Coal Company.—This company, recently chartered, with a capital of $6,000,000, has opened offices in New York City. The company is composed of Senator S. B. Elkins, president; Davis Elkins, vice-president, and S. B. Elkins, Jr., second vice-president and general sales agent. The company owns 50,000 acres of coal land at Morgantown, which carries 3 veins, the Masontown, Upper Freeport and the Kittaning. It also owns the Morgantown & Kingwood Railroad, which connects with the B. & O. The company has at the present time several openings on the property, working the upper Freeport vein, and 75 coke ovens. Other mines will be opened and equipped, and additional coke ovens built.

WISCONSIN.

DOUGLAS COUNTY.

(*From Our Special Correspondent.*)

There are signs of renewed activity on the copper range south of Superior. The Weyerhaueser property, on the Minong Range, in the southeast part of this county, has placed an order for $10,000 worth of machinery. John W. Gates and associates are interested, and Capt. Dunn, of Michigan, is in charge. The Chippewa Copper Mining Company, which closed last fall because of financial troubles, has been reorganized as the Corana Copper Company, of Boston, and is preparing to resume development. This property is on the Douglas Range, and has a shaft down 400 ft., and over 2,000 ft. of underground work in all. The Dedham Mining Company, on the Douglas Range, is preparing to do some development. On the St. Croix Range the only company developing is the Federal.

SAUK COUNTY.

M. L. Patterson Iron Mining Company.—This company has been organized at Baraboo to operate in the North Freedom iron fields. The capital stock is $100,000. The incorporators are M. L. Patterson, J. P. Witmer and Charles Clarke.

Pewabic Company.—This company, of Iron Mountain, Mich., has taken over the options of John Erickson, W. J. Richards and J. T. Gibson, of Crystal Falls, in the new North Freedom iron district. The properties adjoin the property of the Illinois Mining Company. The Pewabic Company will prospect with a diamond drill, and Capt. James Burgess will be in charge.

WYOMING.

CARBON COUNTY.

Ferris-Haggerty.—The North American Copper Company has, it is said, made second payment of $250,000 on this property, making a total of $500,000. The purchase price is given as $1,000,000.

FOREIGN MINING NEWS

AFRICA.

RHODESIA.

The Chamber of Mines reports the gold output for January at 16,245 oz., bullion, against 15,955 oz. in January, 1902; an increase of 290 oz., or 1.8 per cent. The total this year was equal to 14,458 oz. fine gold, or $298,847.

ASIA.

INDIA—MYSORE.

Kolar Gold-field.—The total production in February is reported at 46,268 oz. crude. For the two months ending February 28 the total was 94,348 oz. crude, against 81,665 oz. in the corresponding period in 1902; an increase of 12,683 oz., or 15.5 per cent. The total this year was equal to 84,913 oz. fine gold, or $1,755,152.

AUSTRALIA.

NEW SOUTH WALES.

Broken Hill Proprietary Company.—This company reports that the output of the refinery for the four weeks ending February 25 was 370,686 oz. silver, 5,025 tons lead and 44 tons hard, or antimonial, lead.

QUEENSLAND.

Mount Morgan Gold Mining Company.—This company reports that during the month of January there were 18,317 tons of ore treated by chlorination, the yield being 11,082 oz. gold; an average of 0.60 oz. per ton.

TASMANIA.

Mount Lyell Mining Company.—This company reports for the four weeks ending February 4 the smelters treated 22,958 tons of ore. The yield was 456 tons black copper, containing 451 tons fine copper, 44,044 oz. silver and 1,616 oz. gold. The average yield was 1.96 per cent copper, 1.96 oz. silver and 0.07 oz. gold per ton.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

(*From Our Special Correspondent.*)

Boundary Ore Shipments.—The output of the mines for the week ending February 28 amounted to 13,764 tons, as follows: Granby Mines, 11,234 tons; Snowshoe, 690; Sunset, 520; Emma, 570; B. C., 720; Providence, 21 tons.

British Columbia Copper Company.—The directors are F. L. Underwood, F. L. Sommer, C. A. Starbuck, W. H. Thomas, C. E. Laidlaw, P. G. Bartlett, John D. Kernan and R. H. Eggleston. The officers are F. L. Underwood, president; F. L. Sommer, vice-president; R. H. Eggleston, secretary, and C. E. Laidlaw, treasurer. The executive committee will consist of F. L. Underwood, F. L. Sommer and C. A. Starbuck.

Granby Consolidated.—Charles S. Sangster, mechanical expert for the Canadian Rand Drill Company, of Sherbrooke, Que., has assembled the great air compressor. The compressor will be driven by electricity, with 2 motors, each of 700 h.p. These motors were recently shipped from the makers, the Westinghouse Electrical Company, of Pittsburg, Pa. The Granby Smelter treated in the week ending February 28, 9,231 tons, making a total for this year of 57,584 tons.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crows Nest Pass Coal Company.—Efforts to settle the strike are being made by the provincial minister of labor. Manager Tonkin has signified his willingness to meet committees of the miners' unions from each of the three camps, Fernie, Morrissey and Michel. Elias Rogers, of Toronto, has resigned his position as managing director, and Manager Tonkin will now perform all the duties of the general manager and managing director.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments of ore for the week ending February 28 are given as follows in a press dispatch: Le Roi, 4,983 tons; Center Star, 1,260; War Eagle, 1,080; Velvet, 175; Le Roi No. 2, 630; total for week, 8,125; year to date, 60,044. The War Eagle and Center Star, as well as the Velvet, have discontinued shipping second class ore because of the coke shortage at smelters, but the output remains large. The Le Roi No. 2 has completed a survey of the concentrator site, and Elmore concentrating machinery is now being shipped from England. The O. K. Mine has been leased to parties familiar with the ground, who expect to pick up lost pay-streaks.

NOVA SCOTIA—CAPE BRETON.

Canadian Coal and Steel Company.—This company lately organized at Montreal and Toronto, has acquired ore deposits on the Labrador coast, and is negotiating for coal areas in Cape Breton. The company may locate its steel plant at Sydney. A. J. Moxham, lately general manager of the Dominion Iron and Steel Company, may return to Cape Breton as general manager.

Dominion Iron and Steel Company.—This company, lessee of the Dominion Coal Company, in February produced 255,802 tons of coal from its mines, compared with 197,948 tons in February, 1902.

NOVA SCOTIA—HALIFAX COUNTY.

Dominion Antimony Company.—This company, capitalized at $1,000,000, has been organized to work deposits of antimony and gold ore at West Gore, 20 miles from Windsor, and 2 miles from the Midland Railroad. The deposits are owned by Alexander McNeill, of Halifax, who is president of the company. C. N. Gowe is mine manager.

ONTARIO—MANITOU DISTRICT.

(*From Our Special Correspondent.*)

Big Master.—This mine has closed down for lack of wood for fuel. A large amount is now being cut and hauled. It is expected that the mill will soon start.

Summit Lake Gold Mining Company.—S. V. Halstead, general manager, was in Rat Portage recently. His company is operating the Little Master, Peninsula and Imperial mines, on which development is progressing with satisfactory results. Necessary machinery for deep mining will soon arrive. There is plenty of timber and a large quantity is cut for use. There are some good water powers in the district for generating electricity. The one at Dryden is reported sufficient to supply all the mines in the district, and to operate the proposed railway. Application is already made for this.

YUKON TERRITORY.

Joseph Ladue Gold Mining and Development Company.—This company, at a recent meeting in Jersey City, N. J., elected these officers: Chairman board of directors, Smith M. Weed; president, E. F. Botsford; first vice-president, W. A. Phelan; second vice-president, G. S. Bixby; secretary and treasurer, A. W. Emery; assistant secretary and treasurer, H. Merton Merrihew.

NEW ZEALAND.

The Mines Department reports exports of gold and silver for December and the year ending December 31 as follows, the gold in crude or bullion:

	Gold.		Silver.	
	1901.	1902.	1901.	1902.
Ounces:				
December	45,236	64,071	85,805	82,557
Year	455,561	508,048	571,134	673,986

The gold reported for the year showed an increase of 52,487 oz., or 11.5 per cent; the silver an increase of 102,852 oz., or 18.1 per cent. The gold bullion in 1902 was equal to 459,456 oz. fine gold, or $9,496,958. The greater part of the silver was from the mines in the Ohinemuri country, in the Hauraki District.

MINING STOCKS.

(Full quotations are given on pages 466 and 467.)

New York March 18.

Fluctuations are in accordance with the wishes of professional operators. Those conversant with speculators' tactics are of the opinion that preparations are being made for a boom in the copper shares. In fact, there are already evidences that better prices will rule in the near future, but it is too soon to predict an advance to the high points touched in 1901, when Amalgamated sold up to $130.

This week Amalgamated sold down from $74¾ to $71⅞, but later on pool support rose to $73¾. Insiders are said to have been sellers at one time. Anaconda fluctuated sympathetically, rising to $30.87½, then falling to $29.37½, but soon after recovered to $31 on increased dealings. Tennessee, on curb, was sold at $33½@$30½, little stock being offered. Greene Consolidated, of Mexico, was uninteresting at $26½ to $25⅛. United, Heinze's company, has been lower primarily because the underwriting syndicate which floated the concern will expire on March 20. It is thought, however, that the syndicate will secure an extension to the end of the year, in which case the participants are to receive a cash dividend of 7 per cent. Sales of the stock were made on Monday at $25, but on Tuesday all sorts of prices were heard, some bids being as low as $10, though holders asked up to $21. British Columbia copper stocks were stationary, as the coal strike there prevents active operations at the mines. British Columbia Company stock held at $6⅝ to $6½, while Montreal & Boston was $1⅝ on moderate dealings. The Montreal & Boston Company had a surplus of $125,629 on December 31, 1902, from a year's work, which compares with $149,639 on the same day in 1901. President Melville says that as soon as a sufficient supply of coke is obtained the third furnace will be blown in. Had not the coal strike taken place in British Columbia, it is said, dividends of 4 per cent, payable quarterly, would have been started on May 1, as was intended.

Quicksilver Company shares, of California, hold around $7 for the preferred and $2 for the common. On February 28 the company had cash on hand, $57,980, while the quicksilver in stock was valued at $25,296, making a total of $83,276. Current earnings are equal to about 1½ per cent on the preferred stock. These shares receive ½ per cent annually in dividends, the last having been paid in May, 1902. The common stock has not received a dividend in years.

Colorado gold stocks are quiet, owing to the continued labor trouble at the mills and smelters. Portland fell from $1.40 to $1.23, while Elkton sold at 37c.

Brunswick Gold, of California, sold down to 2c. A second assessment this year of 3c. has been called.

The Comstock shares are softening. Best & Belcher, which was the leader in the recent flurry, has weakened since another 15c. assessment has been announced. Caledonia dropped from $2.90 to $2.65, and Consolidated California & Virginia from $2.15 to $2.10. Ophir sold at $2.15, and Sierra Nevada at $1.10. Comstock Tunnel securities are in better shape, the stock selling up to 15c., and the bonds to 12.

Boston. March 17.

(From Our Special Correspondent.)

Activity for the moment is in the cheaper class of copper shares, such as Winona, Elm River and Wyandot. The good showing made at the Winona leads to expectations that good copper-bearing ground may be found in the other two, which are adjoining properties. Allouez also started by rising $2 to $7.50. Winona is selling assessment of $1 paid, and has advanced $5.75 to $14.75, with subsequent reaction to $13. Lawson is reported to have taken on about 10,000 shares. Wyandot has advanced $1.25 to $2.87½, which is large on the percentage basis. Elm River rose $1.50 to $5, largely through Lawson manipulation. He is advising the purchase of this stock. United States Coal and Oil has been well bought, and rose $2 to $17, reacting to $15.87½. This company is expected to become a producer in the coal department by October. One house has been a large buyer of the stock for inside interests.

The drop of $22 in the price of Dominion Iron and Steel to $30.50 in the week has not hurt local people, but Canadians certainly must have dropped considerable money. Banks have been calling loans for some time, and the position of the stock has been weak for a long period. The stock sold at $79.87½ last August. The close to-night was $36.75. Dominion Coal sympathized in the decline to the extent of $6.50, touching $116, and closing at $121.50. Parrot Mining rose $3.87½ to $33.37 on early dividend talk, reacting to $32. Osceola spurted $5.25 to $76.75, reacting to $73. A 5,000-share pool is reported in this stock. The annual meeting last week was a docile affair, although the Lake people named three people on the directory. The charter was also extended for 30 years. The Mass mining annual meeting found a tangled condition of affairs, while a few changes were made in the board. A committee was appointed to investigate the finances of the company. The property itself seems to be all right for a low grade proposition. Copper Range has fluctuated between $72.87½ and $69.25, and is active by fits and starts. Calumet & Hecla rose $21 to $551, reacting $11, and Quincy rose $6 to $122, reacting $2. Utah has been heavy for the most part, closing about the same as a week ago at $29.62½. Centennial has also been a laggard, closing off 50c. at $28.25. Atlantic advanced $1 to $14, and Bingham has been firm at from $35.75 to $34.25. Wolverine touched $77, reacting $2.50, and Trimountain sold at $97.50@$100.

There is a story going around among a select few that the price of copper is being manipulated to facilitate speculation in the share market, more particularly Amalgamated, and that the price of the metal will be driven to a price to allow of putting Amalgamated to $100 per share. This will allow the pool, which is composed of insiders, to unload all the way up from $75 to $100 per share, and down again. Other copper shares will move in proportion. This is given for what it is worth.

Colorado Springs. March 13.

(From Our Special Correspondent.)

The market tightened perceptibly the last days of the week, as if pointing to close times as a result of the strike. The leading brokers have been pursuing a policy of conservatism which is reflected generally all along the list. Prices have been unusually sensitive, and gains and losses characterized the week's trading. There is hardly a stock that did not oscillate, and some of the differences marked quite a wide range. El Paso was about the greatest loser of the week, although it made up nearly all that it lost during the earlier part by the gain of to-day. The stock sold a week ago at 58½@57 up to 58c., and back to 57¼c. The next day it broke to 56½c., followed by 56c. the next day, selling at that figure and up to 57c. to-day. Elkton lost 1c. selling from 38 to 37c., during the week. Acacia sold up from 9¼ to 9½c.

Isabella was interesting this week, and sold up to 20c. on the 7th, down to 18c. on the 9th, advanced to 19½c., closing the week at 19¾c. to-day. Moon Anchor sold at 8c., with no demand. Portland was featureless, and sold at $1.30 flat, and Vindicator at $1. Work weakened from 7 to 6¾c. The balance of the market was fairly active, principally with the prospect stocks, but no advances of note were made.

Salt Lake City. March 13.

(From Our Special Correspondent.)

The market for the week showed a steady condition. Prices advanced during the week, but closed at about the opening. Among those registering gains are Boss Tweed, with 3,100 shares, going at 27@25c.; Daly-Judge, 1,480 shares, at $10.60@$10.30; Grand Central, 1,175 shares, at $5.65@$5.40; Mammoth, 2,500 shares, at $1.42@$1.30; May Day, 14,100 shares, at 17½@13½c.; Sacramento, 22,100 shares, at 28¾@27c.; Victor, 5,900 shares, at 27½@25¾c. Of those registering declines, California sold 7,825 shares, at 9¼@6c.; Carisa, 9,800 shares, at 14½@13c.; Consolidated Mercur, 4,000 shares, at $1.66@$1.60; Lower Mammoth, 11,000 shares, at 59½@56½c.; New York Bonanza, 26,100 shares, at 23½@22c.; Wabash, 37,700 shares, at 40@30c. Daly and Daly West remain steady, as do Century, Creole, Ingot, La Reine, Martha Washington, Silver Shield and Yankee Consolidated. The amount of business increased over last week's record, the sales being 238,273 shares, which brought $160,229.

San Francisco. March 14.

(From Our Special Correspondent.)

The market was a little off this week, especially for the North End Comstocks. The Gold Hill shares were comparatively firm. Buying orders are falling off, and it seems doubtful how long the present level can be maintained.

The sworn statements of the mining companies, as filed this week, show cash on hand March 1 as below, with all expenses paid, unless otherwise noted: Alta, $1, with indebtedness of $1,378; Andes, $6,842, with $3,122 due on electric hoist contract; Belcher, $2,058, with $7,720 indebtedness and February expenses unpaid; Caledonia, $3,160, with February expenses unpaid; Consolidated California & Virginia, $1,415, with $14,000 due on notes at bank; Crown Point, $9,090, with February expenses unpaid; Chollar, $3,159; Consolidated Imperial, $2,159; Challenge Consolidated, $1,973; Confidence, $1,585, with February expenses unpaid; Gould & Curry, $3,844, with bills receivable of $7,500, and liabilities of $9,010; Julia Consolidated, $1,484; Justice, $958, with indebtedness of $5,838; Mexican, $4,963; Ophir, $680, with $4,000 due on notes at bank; Overman, $201, with indebtedness of $446, and February expenses unpaid; Potosi, $2,995; Silver Hill, $16,747; Savage, $7,302; Segregated Belcher, $1,885; Sierra Nevada, $4,275; Syndicate, $2,094; Standard Consolidated, $103,787, with February clean-up and February expenses to be accounted for; Union Consolidated, $1,772; Utah Consolidated, $693.

The following companies report no cash, with indebtedness as shown: Best & Belcher, $14, besides bills payable of $7,500; Lady Washington, $927.

The following companies in the above list have assessments in course of collection: Andes, Consolidated California & Virginia, Crown Point, Chollar, Justice, Mexican Overman, Union Consolidated and Best & Belcher.

In oil stocks business has been active, but stocks are being taken chiefly in small lots. Hanford sold this week at $115; Thirty-three, $9; Sterling, $3.50; Home, $3.15; Sovereign, 42c.; Reed Crude, 32c.; Oil City, 31c.; Superior, 9c. The last named stock is a new favorite and sold largely.

COAL TRADE REVIEW.

New York, March 19.

ANTHRACITE.

The report of the Anthracite Arbitration Commission has been awaited with interest by the coal trade since the Commission's findings will undoubtedly go a long way in determining what discounts, if any, will be made from present prices on April 1 by the railroad companies. There has been much guessing as to just what the report will say, and much speculation as to whether the commission will rise above political truckling and determine the points at issue in a clear, calm, dispassionate manner, resting awards on the law and the constitution rather than on a supposed necessity of conciliating the labor vote. However, it was hardly to be expected that such a body as the Anthracite Commission should not avoid making some concessions to organized labor, if its report were to be unanimous. Whether the report is satisfactory to the miners or not, the miners had every chance to state their grievances, and to convince the commission of the justice of their demands, and it is hardly probable that the public will support them in another strike unless the operators make almost inconceivable blunders.

March so far has been a gentle month, of mild manners, in strong contrast to March, 1902, and the consumption of coal for domestic purposes has probably correspondingly decreased. Demand, however, is still widely distributed, and the present heavy output of the collieries is taken about as fast as mined. In Lake Superior territory, St. Paul and Minneapolis continue to receive a little coal all-rail, enough for current needs. The outlook at present is that Lake navigation will open earlier than in some years. In Chicago anthracite is still retailing at $9@$10 The opening of navigation will mean a drop in prices. It is an open question how much anthracite will be needed in this territory next winter at the prices expected, in view of the increased use of bituminous this winter. Along the lower lakes and in the all-rail trade farther east the total demand prevents coal from accumulating. At tidewater points the market is now on a weather basis, and during the week has been quiet. Many yards at New England points have got coal enough to last them until April, and so are out of the market until they know what spring prices will be. At New York coal is retailing for $6@$6.25. The regular price for egg, stove and nut sizes of free-burning white ash, f. o. b. New York Harbor shipping port, is $5. Pea is $2.75, and buckwheat $2.25.

BITUMINOUS.

In the Atlantic seaboard bituminous trade there is, if anything, less active just now than a week ago. The large tonnage of foreign coal received at ports east of New York has been about cared for. Some of it laid for days under demurrage, and the importers finally sold it at prices which could have left little profit. Further importations, but in small amounts, may be expected at points beyond Cape Cod, unless prices for domestic coals weaken. At present the speculative market is decidedly quiet, with ordinary grades of Clearfield selling at $2.95, f. o. b. New York Harbor, with even lower prices reported. So far as domestic coals are concerned, the situation is entirely in the hands of the railroads. If car supply should increase to even 75 per cent of the wants of producers prices at tidewater will fall still more. If car supply were sufficient, prices on certain grades would fall so low as to greatly lessen the chances of further purchases of Scotch and English coals.

As regards the chances of labor troubles at the mines, the outlook at points in the Pocahontas and New River fields in West Virginia is pretty dark, and it is altogether possible that labor agitators may get the men out at a number of mines. In Maryland, however, the prestige of the United Mine Workers suffered greatly a few years ago when the miners returned to work after nearly 8 months' idleness, with nothing gained, and the chances are that there will be no general strike this year, particularly as a number of companies have promised their men proportionately greater increases in pay than have been secured by the United Mine Workers in the Pittsburg District or in Illinois and Indiana.

Trade in the far East is quiet, and so far as domestic coals are concerned the arriving cargoes are on contract orders. Along Long Island there is yet some demand for speculative coal, but it has fallen

with the increasing amounts arriving at tidewater, due to improved car supply at the mines. At New York Harbor points consumers and dealers seem well supplied to meet current demands. In the all-rail trade some concerns are accumulating supplies, and generally there are very few really in immediate need.

Transportation from mines to tidewater continues prompt, with coal running through in less than a week. Car supply has improved materially of late, though still far below the total needs of producers, and averages up to 50 per cent of the demand. In the coastwise vessel market large craft continue in good supply, and rates are, with fair weather, a little weaker. Rates from New York Harbor to Sound ports are 65@70c., and to Boston, Salem and Portland, 85@90c. From Philadelphia rates are 75@80c. to Sound ports, and 95c.@$1 to Boston, Salem and Portland.

Birmingham. March 16.

(From Our Special Correspondent.)

Almost incessant rain in this State in the past few weeks has disturbed work in the mines considerably, and the production of coal has been a little off lately. At several places it was necessary to shut down partially or entirely in order to set the pumps at work and make it safe for mining. There is a strong demand for coal, and the railroads are still finding some trouble in having their demands met promptly.

The Bessemer Land and Improvement Company, now operating large mines in Bibb County, near Belle Ellen, has about closed a deal for the purchase of the Cane Creek Coal Company's property, also in Bibb County. The latter company has several thousand acres of land. The Central Iron and Coal Company is getting ready for a regular output at the mines in Tuskaloosa County. The railroad extension is now being rushed.

The coke production in Alabama is keeping up well, and good prices prevail. The consumption of coke is still great and much is yet being imported from the Virginias and other States.

Chicago. March 16.

(From Our Special Correspondent.)

Mild weather has again reduced the prices of coal in the Chicago market, and increased the supply to such an extent that talk of a coal famine is at an end. Smokeless has declined 50c. (Maryland and Pocahontas) for car-lots, being quoted to-day at $4.50; Hocking also has gone down, being now $3.50, against $4 of last week. Youghiogheny shows a still greater reduction, the price being now $5 against $3.75 a week ago. Illinois and Indiana lump and egg are quoted at $2.50@$3, the former price being nearer an average for the better grades. Jupiter lump and egg brings $3. On most of the bituminous coal now being sold there has been a lowering in price of $1 in the last two weeks.

In anticipation of higher freight rates after April 1, and an increased cost of mining, consumers of bituminous are buying largely now. Out-of-town trade is said to be especially good. Anthracite is still retailing at $9@$10, but the price will drop greatly after the opening of navigation, now near at hand. Dealers in anthracite do not expect the usual spring trade in preparation for the coming winter, because of the fact that the mines have not yet caught up with the general demand. The opinion expressed by leading dealers is that the anthracite trade will not be nearly normal until the close of summer or the middle of autumn. Much attention has been paid also this winter to the economical use of bituminous, with the result that there will probably be a considerable permanent use of it as a substitute for anthracite. The demand for smokeless has been very great, and will doubtless continue to be much greater than it has normally been in previous years.

After several weeks of advertised prosecution for the benefit of the public, the suit begun by the State attorney for Cook County in the name of the people against the Bogle combination of coal mines in Indiana, has been thrown out of the State courts, through a ruling by Judge Chetlain, holding that it properly should be brought in the Federal courts. This probably ends the attempt to make use of the State conspiracy law against combinations of coal mines. That law has been made such an engine of prosecution for political and personal ends, that it is likely to be repealed by the present Legislature. No large business built up of combinations of small ones is apparently safe from being attacked under this law, and even radical leaders of socialistic sympathies have declared against it.

Cleveland. March 17.

(From Our Special Correspondent.)

Coal shippers by lake to the Northwest are beginning to prepare to ship their coal for the coming season. Consignments have been coming in from the mines for the past ten days, and the machinery on some of the docks has started to load the boats. It is now generally expected that by the end of two weeks the lakes will be open to navigation, and that the coal will be moved. Only a few charters have been made, and they are all dependent upon the rates that are paid at the opening of the season of navigation. The shippers have made no engagements with the vessel-men so far, and only a few inquiries for tonnage on contract have been made. The general talk now is that the rate will be 50c. between Ohio ports and Duluth. The shipments this year will be enormous.

The lake coal men have announced their prices for fuel for the coming season. The new price is $2.95 per ton, an advance of 40c.

The railroad condition in this section is materially improved. The embargoes have all been lifted and the movement is now freer than it has been at any time since the set-in of winter. The railroads announce that normal conditions have been resumed. It must be admitted, however, that the furnaces are collecting no surplus of coke, and that the mills at times are forced to run short because of the scarcity of coal. In the main, however, the factories are well supplied, and there have been no suspensions of operations on account of the coal supply. The coal men have announced no prices on material for the coming year so far.

Pittsburg. March 17.

(From Our Special Correspondent.)

Coal.—The market is active, but producers hesitate in making contracts, even at the advanced price, owing to the uncertainty of transportation. Mines continue to be operated irregularly on account of the shortage of railroad cars. Indications are that a still further advance than the one announced to take effect on April 1 will be ordered by the railroad coal producers. It was reported to-day that the Monongahela River Consolidated Coal and Coke Company, the river coal combine, had decided to advance prices 2½c. a bu., or about 20c. a ton, above the new rate fixed by the Pittsburg Coal Company, but one of the officers declared that the new price had not yet been definitely determined. The rivers have been navigable continuously for several weeks, and a heavy tonnage has gone to the lower ports. Tow-boats with empty barges are coming in almost daily, and all the river coal mines are in full operation.

Connellsville Coke.—Prompt coke is in urgent demand and high prices continue. It is difficult to get foundry coke for early delivery at less than $7.50 at the ovens, and for furnace coke the price ranges from $5.50 to $6. While there is an improvement in transportation there are about 600,000 tons of coke stocked in the yards throughout the region. The *Courier*, in its last report, gives the production for the previous week at 245,720 tons. The shipments aggregated 10,299 cars, distributed as follows: To Pittsburg and river tipples, 3,686 cars; to points west of Pittsburg, 5,126 cars; to points east of Connellsville, 1,487 cars. This was an increase of 936 cars compared with the shipments of the previous week.

San Francisco. March 14.

(From Our Special Correspondent.)

The market continues quiet, with the usual arrivals and good stocks, except in Eastern coals.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington, $8.50; Southfield, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Spring and Sunnyside. Eastern coal in cargo lots is at present nominal, but quotations continue at $14 for Pennsylvania anthracite and $12 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo, $7.50; Wallsend, $6.50.

Foreign Coal Trade. March 18.

Export trade continues quiet, and very little new business is reported. Imports of coal continue on a fair scale, though some falling off is now apparent.

Exports of coal from Germany in January are reported as follows, in metric tons:

	1902.	1903.	Changes.
Coal	1,186,077	1,643,875	I. 457,798
Brown coal	1,243	1,822	I. 579
Coke	154,740	208,278	I. 53,538
Total	1,342,060	1,853,975	I. 511,915

The exports in January of this year included 151 tons coal and 1,700 tons coke to the United States.

Imports of fuel into Germany in January were as follows, in metric tons:

	1902.	1903.	Changes.
Coal	348,680	358,709	I. 10,029
Brown coal	492,330	548,802	I. 56,472
Coke	32,224	35,103	I. 2,879
Total	873,234	942,614	I. 69,380

The chief imports of coal were from Great Britain; those of brown coal were all from Austria.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of March 7, that the large coal market continues very quiet and prices show no change. Small descriptions, on the other hand, are rather scarce and slightly improved in price. Quotations are:

Best Welsh steam coal, $3.42@$3.48; seconds, $3.36; thirds, $3.24; dry coals, $3.24; best Monmouthshire, $3.12@$3.18; seconds, $3.06; best small steam coal, $2.16; seconds, $2.04; other sorts, $1.80.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The general tone of the freight market and rates are unaltered. Some rates quoted from Cardiff are: Marseilles, $1.60; Genoa, $1.68; Naples, $1.62; Singapore, $2.52; Las Palmas, $1.50; St. Vincent, $1.68; Rio de Janeiro, $2.52; Santos, $2.88; Buenos Aires, $2.10.

IRON TRADE REVIEW.

New York, March 19.

Buying for the second half of the year is now going on quite freely. In Pittsburg there have been large transactions in bessemer and basic pig, and the supply of bessemer seems to be less than the demand. Foundry iron is also selling freely, for second half delivery.

While no further formal announcement has been made as to Lake ore prices, sales are being closed on the basis heretofore noted—$4.50 for Old Range bessemer, and $4 for Mesabi bessemer, at Lake Erie ports.

In finished material, bars, plates and structural steel are in strong demand. There are also many inquiries for girder rails and other material for electric roads. Some of these enterprises will probably have to be postponed, as it will be difficult for them to get material.

Trade in Europe is improving very much, and parties who are expecting to buy material abroad will find it much harder to get concessions in price than heretofore. A stiffening in quotations for foreign pig iron and steel billets is already apparent.

Exports of iron and steel from Germany in January are reported as follows, in metric tons:

	1902.	1903.	Changes.
Pig iron	34,659	39,458	I. 4,799
Other iron and steel	248,148	263,620	I. 15,472
Total	282,807	303,078	I. 20,271

Imports included 11,144 tons pig iron and 9,609 tons other iron and steel; against 13,209 and 9,156 tons, respectively, in January, 1902. The imports of iron ore were 294,843 tons, against 215,308 tons in January, 1902. The exports of ore were 278,507 tons, against 167,538 tons.

Birmingham. March 16.

(From Our Special Correspondent.)

The bad weather, which has almost been continuous in Alabama, has retarded the new furnace construction and the repairing of furnaces. The blowing in of the new furnace of the Alabama Consolidated Coal and Iron Company at Gadsden has been delayed by the bad weather. The repairing of Philadelphia Furnace belonging to the Sloss-Sheffield Steel and Iron Company, and located at Florence, has also been retarded by the weather and by slow delivery of material. A small fire delayed the blowing in of the recently repaired Alice Furnace belonging to the Tennessee Coal, Iron and Railroad Company, located in this city. This furnace should go into blast this week. The furnace at Talladega, belonging to the Alabama Coal and Iron Company, was out of blast during the past week because of some unforeseen accident, but steady work has been resumed.

The sales which have been made recently in this State have not been of very great size, but they aggregate well. The following quotations are given: No. 1 foundry, $19@$20; No. 2 foundry, $18.50@$20; No. 3 foundry, $17.50@$18.50; No. 4 foundry, $16.50@$17.50; gray forge, $16@$17; No. 1 soft, $19@$20; No. 2 soft, $18.50@$20.

In finished iron and steel better work is to be seen now at the steel plant and rolling mills. With the exception of one or two the open-hearth furnaces at the steel plant of the Tennessee Coal, Iron and Railroad Company's plant at Ensley are in full operation. The preparations have been completed for the starting of the steel rail mill on April 1. Some heavier engines and other machinery have just been received and are now being put in place. A full complement of laborers are employed at the Birmingham mills, except in the plate and sheet mill departments, and in all departments at the Gate City and Bessemer rolling mills. It is announced that there is a little better demand for the mill product.

The plant of the Alabama Tube and Iron Company at Helena, 17 miles south of Birmingham, has been closed down for two weeks, some dissensions being on in the company.

Mr. E. T. Shuler, of the Alabama Steel and Wire Company, which is building four furnaces and a steel plant at Gadsden, Ala., was in Birmingham during the past week, and stated that one of the furnaces would be ready for blowing in this summer. The steel rod, wire and nail mills at Ensley belonging to the company, are buying all of the steel at present from the Tennessee Coal, Iron and Railroad Company. It is understood that contracts are about to expire, and for

that reason the Alabama Company desires to have its own resources.

The embarrassments with the Anniston rolling mills are being cleared up, and it is believed the plant can resume operations again by April 10, if not sooner.

Chicago. March 16.

(From Our Special Correspondent.)

There is little change in the pig iron market. The steady though slow increase of the last three or four weeks continues, and sales are fairly active for the last half of the year. Prices continue unchanged for deliveries in the last half: $23@$23.50 for No. 2 Northern, and $22.85@$23.35 for No. 2 Southern, with No. 1 selling 50c. higher and No. 2 the same amount lower than No. 2 for lots of corresponding size and time of delivery. For quick delivery the premium is $2@$5. Transportation difficulties continue to retard coke deliveries, notwithstanding the general easing of railroad business that is reported to have come about through the breaking of winter. Coke continues at $9.50@$10, the latter price being willingly paid for first-class foundry.

One of the Iroquois Iron Company's two furnaces at South Chicago, which has been closed since December, will go into blast again this week. This furnace was originally shut down for the purpose of putting in a new lining, but continued closed because of lack of coke. The company has added largely to its car equipment, and for this reason counts upon a better supply of coke hereafter.

Cleveland. March 17.

(From Our Special Correspondent.)

Iron Ore.—The iron ore producers of the Lake Superior region have fixed their prices for the coming season. This was done without any general or definite action on the part of the Ore Association, which seems to have passed out of existence as far as any concerted action is concerned. The prices have been named, however, and are identical with each shipper. The base prices are $4.50 for bessemer old Range, and $4 for bessemer Mesabi. No agreement was reached, other than a tacit understanding, as to the output of the lower grade ores and the prices to be received for the same. Nothing has been done so far as to the rates which are to be paid during the coming season for carrying the ore down the lakes.

Pig Iron.—The supply of pig iron for spot delivery is now coming only from the furnaces of southern Ohio and from the Birmingham District, where the supply is limited. The Valley furnaces seem to have nothing whatever to sell for the present, and it is a question whether they will be able to supply anything more before July. The prices charged by the furnaces of southern Ohio are $22, f. o. b. furnace, with a freight rate of $1.45 to make up the prices at Cleveland. Valley furnaces are asking $21@$21.50 for second half delivery. The Southern furnaces are asking $18.50@$20, Birmingham, for spot delivery, and $18 to $19 for second half delivery. The basic furnaces in this territory are off the market for the time being. It is hardly possible that they will have any material for sale before July. A few small lots are being purchased here and there, but the supply is not equal to the demand. The prices asked and received for first half delivery are $21.50@$22 at furnace, and $20 for second half delivery. It is hardly possible to obtain anything for first half, and buying for second half is light. Bessemer pig is in fair demand at $21.50@$22 for first half and $20.50@$21 for second half delivery.

Finished Material.—The demand for steel rails of the standard grade has continued firm, with a good many inquiries coming in from the electric lines, either in course of construction or projected. The inquiries are quite heavy, and the demand seems to be growing. The tonnage in sight is immense. The prices have held firm at $28, Pittsburg, for large contracts, and $30, Pittsburg, for amounts 500 tons and less. The demand for light rails at $36, Pittsburg, is encouraging. Bars are hard to obtain, the production being curtailed by the shortage of scrap and of basic pig, and the demands of the market being almost excessive. The result has been that the prices have jumped to 1.85c., Youngstown, and the prospects are that further advances will soon be seen. The buying of bessemer steel is steady, but many big orders are not coming in. It is apparent that many of the argricultural implement works have not yet covered their needs, and are holding off for some reason or other. The prices are firm at 1.60c., Pittsburg, for bessemer, and 1.70c., Pittsburg, for open-hearth. The sheet trade is more promising than it has been, but the prices have not advanced. The mills are relieved of the necessity of looking for orders, and it is now beginning to appear as if they would have all they could care for soon. Prices are held firm at 3.10@3.25c. for No. 27, out of stock, as a base. The plate trade has been moderate only. Specifications on old contracts have been heavy but the new orders are few, largely because the mills are not in a position to handle them. The smaller mills are having a good business on premiums. The prices hold as they have been, 1.60c., Pittsburg, from the large mills, and 2c. at the mills from the smaller concerns. The structural steel makers are having all they care to do to meet the demands of the trade, as is shown by the fact that the larger concerns are kept busy with the old contracts, and the smaller mills are filled with premium material covered at 1.75c. to 1.85c. at the mill. The jobbers are sold up at 2.25c. as a maximum.

Philadelphia. March 19.

(From Our Special Correspondent.)

Pig Iron.—The week has passed without the developments looked for a few days ago. A number of large consumers who showed some anxiety two weeks ago in reference to both foundry and forge iron seem to have disappeared from the market, and in answer to inquiries give different and unsatisfactory answers. The facts in this territory may be said to be that none of the larger consumers are in need of iron, but that all are willing to buy when prices are in their favor. Buyers of forge are holding off, even though some of them have comparatively little iron under their control. In bessemer pig prices are very strong and on account of heavy dealings in other territory the tendency here is upward. In basic pig the high level reached some time since is maintained. Much interest has been aroused in foreign pig iron, and this interest has been strengthened by the advances made. The importers are reminding their customers of their advice given some time ago to hurry in whatever orders they contemplated placing this spring. According to present outgivings a further advance in foreign pig is probable. What our people will do is a question that they do not answer and the importers are not able to answer. The market often takes sudden turns. Some brokers think they see a dullness for two or three weeks to come, but that is a mere opinion. It is needless to say that the consumption of iron is increasing rather than diminishing, and that the producers have the advantage. Quotations may be given generally as at $24@$25 for No. 1 foundry; No. 2 is $22.50; No. 2 plain, $22; gray forge, $20@$21; basic, $20.50@$21; Middlesboro No. 3, in small lots, $21.50 @$22; Scotch, $23.50.

Steel Billets.—Much interest has been developed within a few days in steel billets, but if any large transactions have been closed the fact has been kept quiet. Quotations are given at $28 for basic German steel. American steel is quoted generally from $33 @$35.50.

Plates.—Many orders are coming in from all quarters, and we are getting a little overflow business from Western territory, where the mills are apparently too much crowded to accommodate recent buyers. Quotations for plates may be given in a general way at 2.10c. for ¼-in.; universals, 2.10c.; flange, 2.20c.; fire-box, 2.25 to 2.30c.; marine, 2.30@2.40c.

Old Rails.—Old steel is quoted as high as $22 this week and old iron rails could not readily be had under $25.

Scrap.—The scrap market is evidently gaining so far as inquiries from buyers go, but all the scrap that is to be had appears to be either spoken for or already sold under contract. Heavy steel scrap is nominally $21.50, and low phosphorus scrap is quoted at $28. Some country scrap has begun to arrive and a little of it has sold at $21.

Pittsburg. March 17.

(From Our Special Correspondent.)

Inquiries for fully 300,000 tons of bessemer pig iron have come into the market during last week and the early part of this week. In addition to the 75,000 tons mentioned in last week's report orders aggregating about 25,000 tons have been placed for delivery in the last six months of the year at prices a shade firmer than have been named. The range for bessemer now is $20@$20.75, Valley furnaces, for late shipment. So great is the demand from independent interests that it is doubtful if the United States Steel Corporation will get the tonnage from the Bessemer Furnace Association that it has made inquiries for. It is understood that the Corporation is after 200,000 tons, but it is reported to-day that the Association is not willing to make a contract for more than 140,000, and the price will not be less than $20, Valley furnaces, as had been supposed. Negotiations are practically concluded for this amount. Contrary to expectations the Corporation will not supply coke to outside furnaces that fill its orders for pig iron. From present indications it will need all of the coke produced by the H. C. Frick Coke Company at its own blast furnaces, and will have none to spare for outside interests. The transactions in all grades of pig iron are increasing, and the market is unusually firm. A sale of 20,000 tons of basic iron for Western delivery was made during the week at $20, Valley furnaces. Gray forge is particularly active this week, and there is no change in quotations. Some large sales of foundry iron for delivery in the second half are reported. The freight situation does not show much improvement, and the furnaces in the Valleys are not getting out full production. There are more furnaces in blast, however, than last year, and it is estimated that the production of pig iron in the country so far is slightly in excess of the record of 1902. Prices are certain to go higher, owing to the advanced cost of coke and ore. Some furnaces have received inquiries for pig iron for delivery into next year, but no sales have been recorded and are not likely to be until later in the year.

The iron, steel and tin-plate mills in this district are active, and nearly all have enough business booked to keep them in constant operation until fall. There does not seem to be any fear of trouble in renewing the annual wage agreements with the Amalgamated Association of Iron, Steel and Tin Workers. The workers' convention will be held in Columbus next month, and from the recommendations received from the lodges no demands will be made for an increase in wages in any of the lines. The principal question to be decided will be the demand of the manufacturers for a removal of the limit of production. It will be opposed by some of the delegates, but the probability of a disagreement when conferences are held to adjust the new wage scales, is not even hinted at. A change in the base of the iron scale may be urged by the Republic Iron and Steel Company, as the iron workers are receiving the highest wages under the present scale that have been paid since 1885. At the bi-monthly adjustment held at Youngstown last Thursday the present puddling rate of $6.12½ a ton was continued for March and April, as was the high rate for finishing. The scale is based on the price of common bar iron, which has been selling at 1.85c., Youngstown, for several weeks, and the average sales for January and February were above 1.70c. Indications are that the average sales for this month and April will be above 1.80c., which will entitle the iron workers to a further advance under the present scale for the months of May and June.

The strike of the structural iron workers against the American Bridge Company is likely to prove more serious than was at first anticipated. The company has made no effort to settle, and is now paying a forfeit to the Wabash Railroad for not having completed the bridge over the Monongahela River within the time specified in the contract. The differences between the company and the International Association of Bridge and Structural Iron Workers is so slight that the failure to make any effort to settle has given rise to a report that seems to be well founded that the bridge combine is about to give the workers' organization a fight. It is said that in order to force the men to terms notices will be given to contractors that no steel will be furnished where union men are employed. The company furnished a large building near the new Wabash bridge for the accommodation of new men that are being brought in to take the places of the strikers. Yesterday 31 arrived from Louisville, but all were persuaded by the strikers to refuse to work. The demands of the workers for an advance in wages are for the new scale, which becomes effective on May 1. It is believed the company prefers to make the fight now.

Pig Iron.—Sales of bessemer pig iron aggregating 25,000 tons have been made since the last report for delivery in the second half at prices ranging $20@ $20.75, Valley furnaces. For delivery in the first half of this year the price is $21.50@$22, Valley. Several thousand tons of gray forge were sold during the week at $20.75@$21, Pittsburg. For second half $20@$21.50 is quoted. Foundry No. 2 is firm at $21.50@$22 for first half, and $21, Pittsburg, for the last six months of the year.

Steel.—Both bessemer and open-hearth billets are scarce this week. The former are quoted at $30.50 @$31, Pittsburg, and open-hearth billets are $1 a ton higher. Sales of steel bars during the week aggregated 10,000 tons, and fully 15,000 tons of structural material were sold. Tank plate continues in heavy demand. Most of the sales were at the base price of 1.60c., but in some instances where early delivery was desired a premium was paid.

Sheets.—The sheet market continues strong, and prices are firmly maintained. The American Sheet Steel Company quotes No. 28 gauge black sheets at 2.75c., and galvanized at 75 and 10 per cent off.

Ferro-Manganese.—Domestic producers are again out of the market, and the foreign product is held at $52@$53.

New York. March 19.

Pig Iron.—The market is still rather quiet, though prices are unchanged. We quote for early delivery, Northern irons at tidewater: No. 1X foundry, $23.25 @$23.75; No. 2X, $22.25@$22.75; No. 2 plain, $21.25@$21.75. For Southern iron on dock, New York: No. 1 foundry, $23.75; No. 2, $22.75; No. 3, $21.75.

Plates.—Nominally prices are unchanged, actually certain Eastern mills are meeting the cuts made by Pittsburg mills. We quote for tidewater delivery in car-loads: Tank, ¼-in. and heavier, 2.05c.; flange, 2.15c.

Bar Iron and Steel.—We continue to quote for large lots on dock: Refined bars, 1.95@2c.; soft steel bars, 1.80@1.90c.

Steel Rails.—Standard sections are still quoted at $28, f. o. b. mills for 1903 delivery; light rails, $30 @$36, according to weight. Relaying rails are $28@ $30 for heavy sections and $33@$35 for light sections.

Structural Material.—Demand is still fairly active. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c.

CHEMICALS AND MINERALS.

(See also prices-current on page 468.)

New York, March 18.

The advance in the prices of the commercial metals is exercising a bullish influence over manufactures dependent on such raw materials. In the flurry certain minor substances, such as bismuth preparations, which have been dormant for a long time, have advanced noticeably. Lead pigments are also substantially higher. Briefly, the whole situation appears to be a realization of the long-wished-for improvement in this branch of trade.

Rail and water freight rates from this point to the South will be advanced April 1, and it is hoped quicker dispatch will then be given to goods shipped.

Exports from New York in February included 3,627 barrels of cement, chiefly to Mexico and the West Indies; 198,230 lbs. pot and pearl ashes, principally to England and Italy; 45,687 lbs. salt; $5,107 worth of asbestos, mostly to Belgium and England, and 1,036,990 lbs. zinc oxide, of which Great Britain received 506,688 lbs., France 275,625 lbs., Denmark 132,300 lbs., and Italy 111,352 lbs.

The American Agricultural Chemical Company, known as the Northern fertilizer combination, has made application to the New York Stock Exchange to list an additional $1,000,000 preferred stock, and $500,000 common. This will make the outstanding capital stock, $19,135,000 preferred and $17,100,000 common; total, $36,235,000 of the $40,000,000 authorized capitalization. The company has just declared a 3 per cent semi-annual dividend on the preferred stock, making the eighth, amounting to $4,126,740. Nothing has yet been paid on the common stock. The Virginia-Carolina Chemical Company, the Southern fertilizer combination, is paying dividends at the rate of 8 per cent annually on the preferred stock, and 5 per cent on the common; its outstanding capital stock is $39,984,400, which is $3,749,400 larger than the Northern combination.

Cyanide of Potassium.—Imports are moderate at rather low prices. Exports in lots of 2,500 lbs. to Brazil and Mexico are noted at about 18c. per lb. Sellers quote 20@21c., f. o. b. New York, for domestic orders; but these prices can no doubt be shaded by large consumers.

Bleaching Powder and Chlorine.—Some improvement in demand is noted; but prices continue low for bleaching powder. Domestic sells at $1@$1.12½ per 100 lbs., f. o. b. works, while prime foreign bleach brings $1.20@$1.25, f. o. b. New York, for future shipments, and $1.37½@$1.62½ for early deliveries. Liquid chlorine, imported from Germany, is unchanged at 30c. per lb., f. o. b. New York, and chlorine water, 10c.

Brimstone.—Prices on spot are easy at $22.25@ $22.50 per ton for best unmixed seconds, while shipments are $22@$22.25. Best thirds are about $1 less than seconds.

Pyrites.—The Pennsylvania Salt Manufacturing Company imported 3,799 metric tons Spanish copper pyrites at New York this week, which is the first cargo of its kind reported here in some time. Consumption continues good, as the fertilizer acid manufacturers are replenishing their stocks.

Quotations for pyrites are f. o. b. Mineral City, Va.: Lump ore, $5 per ton, and fines 10c. per unit; Charlemont, Mass., lump, $5, and fines, $4.75. Spanish pyrites, lump, 12@13c.; fines, 10@11c. per unit, delivered at New York and other Atlantic ports. Spanish pyrites contain from 46 to 52 per cent of sulphur; American, from 42 to 44 per cent.

Nitrate of Soda.—This market is strong. Spot is quoted at $2.15@$2.20 per 100 lbs.; and shipments, $1.87½@$2, according to position. The statistical position in Europe is shown below, comparison being made with the corresponding period last year, in long tons:

	1902.	1903.	Changes.
Exports to Europe, Jan.-Feb.....	167,331	190,346	I. 23,015
Imports into Europe, Jan.-Feb..	184,140	238,080	I. 53,940
Deliveries in Europe, Jan.-Feb..	197,380	269,490	I. 72,110
Loadings for Europe, Mar. 1.....	97,907	39,772	D: 58,135
Vis. supply for Europe, Mar. 1..	581,500	582,170	I. 670

Significant changes this year are 36.5 per cent increase in deliveries, and the small difference in the visible supply.

Sulphate of Ammonia.—Gas liquor is firmer in sympathy with nitrate of soda. Immediate deliveries are quoted at $3.15 per 100 lbs., and shipments, $3.12½. A contract for 100 new by-product coke ovens has been given by the Dominion Iron and Steel Company, of Cape Breton, to the United Coke and Gas Company, of New York.

Acids.—Higher cost of raw materials has strengthened prices for commercial acids. Exports in February from New York were $7,725, principally to the West Indies and South America.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity.

Muriatic, 18°	$1.50	Oxalic com'l...	$5.25@$5.50
Muriatic, 20°..	1.60	Sulphuric, 50°,	
Muriatic, 22°.	1.75	bulk, ton....	13.50@14.50
Nitric, 36°....	4.37½	Sulphuric, 60°.	1.05
Nitric, 38°....	4.75	Sulphuric, 60°,	
Nitric, 40°....	5.00	bulk, ton	18.00@20.00
Nitric, 42°....	5.37½	Sulphuric, 66°,	1.20
		bulk, ton	21.00@23.00

Copper Sulphate.—Domestic trade brings higher prices than export, owing to the keen competition abroad with British manufacturers. Stocks here are comparatively small, as refiners show a tendency to decrease rather than increase the production. This is partly explained by the larger production of copper in consequence of advancing prices. Blue vitriol sells, f. o. b. New York, at $5.50@$5.62½ per 100 lbs. for domestic delivery, while exporters quote less confidentially, for reasons well known. Importers of the British article have also strengthened their views, asking $5.87½ for forward cargoes. Abroad the market is particularly strong, and little stock is available for prompt shipment. Exports from New York in February amounted to 3,603,160 lbs., making 4,551,596 lbs. for the first two months this year, which compares with 5,916,756 lbs. in the corresponding period last year. This falling off of 1,365,160 lbs., or about 24 per cent this year, is accounted for chiefly by the smaller number of countries making purchases. Of the total exports this year Italy received 2,680,238 lbs., or 59 per cent (against 3,017,474 lbs., or 51 per cent in 1902), and Austria 1,574,980 lbs., or 35 per cent (against 1,520,289 lbs., or 26 per cent last year). The average invoice value of this year's exports is $3.50 per 100 lbs., which is 49c. less than 1902. Deducting expenses for marketing abroad there can be little profit in exports. This fact is emphasized by the unwillingness of Americans to compete for the 1,000-ton contract offered by Greece recently. It is stated that only one American firm was represented, and it was prevented from taking the contract at the last moment, owing to the destruction of one of its larger plants. The European bids were far too high to be considered favorably, and so the Currant Bank, at Patras, Greece, is now advertising for bids for quantities less than 1,000 tons, hoping to obtain more equitable terms.

Phosphates.—Reports from abroad state that large orders have been booked for this and next year's shipment on basis of quotations below:

Shipments of Florida high-grade rock from Savannah in February were 8,644 long tons, making 15,801 tons for the two months this year, as against 16,799 tons in the same time in 1902—a decrease of 998 tons. Fernandina shipments in February were 6,700 tons, making 9,855 tons this year, which is considerably less than 1902.

Ocean freight rates are reasonable, and latest charters to Baltic ports are on a basis of 13s. ($3.12), which compares with 15s. ($3.60), recently taken.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (78@80%)..	$6.00@$6.50	6¼@6¾d.	$9.88@10.07
*Fla. land peb. (68@73%)..	3.00@ 3.25	4¾@5d.	6.65@ 7.00
†Tenn., (78@82%) export...	3.75@ 4.00	5½@6d.	8.58@ 9.36
†Tenn., 78% domestic.....	3.25@ 3.50	.....	.....
†Tenn., 75% domestic.....	3.00@ 3.25	.....	.....
†Tenn., 73@74% domestic..	2.50@ 2.75	.....	.....
†Tenn., 70@72% domestic...	2.25@ 2.50	.....	.....
‡So. Car. land rock.....	...@ 3.25	4½@4¾d.	5.10@ 5.40
‡So. Car. river rock.....	2.75@ 3.00	.....	.....
Algerian (63@68%)	.....	4½@4¾d.	5.85@ 6.18
Algerian (58@63%)	.....	4¼@4½d.	5.10@5.40
Algerian (53@58%	.....	4¼@4⅝d.	4.62@ 4.90

* Fernandina, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. March 4.

(Special Report of Joseph P. Brunner & Co.)

The market for heavy chemicals is quiet, there being little fresh business reported.

Sulphate of copper is in limited supply, and holders ask £22 10s., while buyers seem pretty well filled up at the moment.

Soda ash is without change. For tierces the nearest quotations may be called about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 9d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@ £4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces.

Caustic Soda is firm, and while not active, orders are coming in fairly well. We quote: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching Powder is quite idle outside of deliveries on running contracts, and quotations are nominal at about £4@£4 5s. per ton, net cash for hardwoor packages.

Chlorate of Potash continues steady at 2⅞@3d. per lb. net cash.

Sulphate of Ammonia is rather easier at £12 10s.@ £12 15s. per ton, less 2½ per cent for good gray 24@ 25 per cent in double bags, f. o. b. here, as to quality.

Nitrate of Soda is selling to a fair extent on spot and is firm at £9 7s. 6d.@£9 10s. per ton, less 2½ per cent for double bags, f. o. b. here, as to quality.

METAL MARKET.

New York, March 19.

Gold and Silver Exports and Imports.

At all United States Ports in February and Year.

Metal	February. 1902.	February. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports...	$8,665,480	$1,506,370	$10,639,155	$1,583,513
Imports....	1,696,967	1,771,758	3,102,754	3,559,905
Excess.	E. $6,968,513	I. $265,388	E. $7,536,401	I. $1,976,392
Silver:				
Exports	$3,923,585	$3,806,514	$8,450,595	$7,443,930
Imports....	2,005,643	1,687,009	4,113,324	3,580,972
Excess.	E $1,920,942	E. $2,179,505	E. $4,337,271	E. $3,862,958

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending March 18, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess. Exports or Imports.
Week ...	$244,000	$645,210	$251,312	$127,925	I. $277,873
1903.....	1,252,551	2,080,830	4,825,595	278,730	E. 3,218,586
1902.....	13,800,727	787,083	8,744,339	303 168	E. 21,454,814
1901.....	9,150,965	659,215	8,585.794	868,000	E. 16,159,145

The movement this week has been chiefly with London and South America.

Financial Notes of the Week.

General business continues strong and active, and no material change is to be reported. The current depression on the stock exchanges seems to have very little effect on trade. Exchange has been strong, and approaches the gold export point, but no gold has yet been taken for shipment abroad.

Exports of merchandise from the United States in February were valued by the Bureau of Statistics of the Treasury Department at $125,502,105, which is $8,529,587 less than in January, but $23,932,410 more than in February, 1902. For the eight months of the fiscal year, from July 1 to February 28, the statement is as follows:

	1902.	1903.
Exports	$974,238,113	$982,019,569
Imports	594,467,457	680,725,759
Excess, exports	$379,770,656	$301,293,810
Add excess of exports, silver		16,845,553
Total		$318,139,363
Deduct excess of imports, gold		17,441,907
Apparent balance		$300,697,456

The gold and silver movement in detail will be found in the usual place, at the head of this column.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending March 14 gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts.	$914,812,700	$929,734,100	$924,500,400
Deposits	1,006,185,600	984,370,000	916,162,000
Circulation	31,585,600	31,497,900	42,937,700
Specie	189,428,100	179,190,900	164,747,800
Legal tenders	72,120,900	70,014,500	65,316,700
Total reserve	$261,549,000	$249,205,400	$230,064,500
Legal requirements ..	251,546,400	246,092,500	229,040,500
Balance surplus ...	$10,002,600	$3,112,900	$1,024,000

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to

dollars and comparison made with the holdings on the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$179,190,900	.....	$164,747,800	.....
England ..	188,248,095	.....	178,707,125	.....
France	504,333,545	$220,529,235	503,450,045	$218,945,170
Germany ...	191,756,500	70,923,500	168,020,000	62,150,000
Spain	70,280,000	89,225,000	72,210,000	99,500,000
Neth'l'ds ..	27,333,500	32,666,500	23,491,500	32,912,500
Belgium ...	15,880,000	7,940,000	16,186,665	8,093,335
Italy	80,425,000	10,622,000	87,630,000	10,916,000
Russia	364,675,000	37,580,000	395,385,000	39,225,000

The returns of the Associated Banks of New York are of date March 14 and the others March 12, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Demand for silver has been stimulated by inquiry for covering of March contracts. It would appear that these settlements have been in large measure completed, and inquiry for silver consequently has not been so active. The market closes steady to firm.

The United States Assay Office in New York reports receipts of 81,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to March 5 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes.
India	£1,552,585	£1,540,400	D. £12,185
China	11,500	106,500	I. 95,000
The Straits	250	128,491	I. 128,241
Total	£1,564,035	£1,775,391	I. £211,356

Receipts for the week, this year, were £154,000 in bar silver from New York, and £4,000 from Australia; total, £158,000. Shipments were £101,100 in bar silver to Bombay, and £10,000 to Calcutta; total, £111,100.

Indian exchange is a little weaker, and the Council bills offered in London sold at an average of 16.03d. per rupee. An increasing demand for silver from India is reported.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$.38¾	$.40¼
Peruvian soles and Chilean pesos	.36	.39
Victoria sovereigns	4.85	4.88
Twenty francs	3.86	3.88
Twenty marks	4.74	4.80
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

March.	Sterling Exchange	—Silver— N. Y. Cts.	London, Pence.	—Copper— Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Tin, Cts. per lb.	Lead Cts. per lb.	—Spelter— N. Y. Cts. per lb.	S. L. Cts. per lb.
				14¼	14¾			4.30		
12	4.86½	49	22⅝	@14½	@14⅝	66½	30⅞	@4.35	5.17½	5.00
				14½	14⅝			4.60		
13	4.86⅝	49⅛	22 11/16	@14¾	@14⅞	65½	30⅝	@4.65	5.20	5.05
				14¾	14⅞			4.60		
14	4.86¼	49	22⅝	@14⅞	@14⅝	....	30½	@4.65	5.25	5.07½
				14¾	14⅝			4.60		5.20
16	4.86⅝	48⅜	22⅝	@14⅞	@14¾	65¼	30½	@4.65	5.40	@5.25
				14⅞	14⅝		30	4.60		
17	4.87	48¼	22 1/16	@15	@14⅞	65¼	@30½	@4.65	5.40	5.25
				15	14¾		30	4.60	5.40	
18	4.87	48⅝	22 1/16	@15⅛	@14⅞	66½	@30½	@4.65	@5.42½	5.25

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper continues in its upward course, with the demand unabated. Most of the producers seem to be practically sold out for several months to come, while consumers appear to be but partly covered for their requirements. At the close we quote lake copper 15 @15¼c.; electrolytic in cakes, wirebars or ingots, 14⅞@14⅞c.; cathodes, 14½@14⅝c., and casting copper, 14⅝c.

The market for standard copper in London, which closed last week at £65 10s., opened on Monday at £65 5s., and the closing quotations on Wednesday are cabled as £66 12s. 6d.@£66 15s. for spot, and £66 10s. @£66 12s. 6d. for three months prompt.

For refined and manufactured sorts we quote: English tough, £69@£69 10s.; best selected, £71 10s.@£72; strong sheets, £79 10s.@£80 10s.; India sheets, £75@£75 10s.; yellow metal, 6⅜@6½d.

Statistics for the first half of the month show an increase in the visible supplies of 100 tons.

Exports of copper from Atlantic ports in the week ending March 17, are reported by our special correspondents, as follows: Great Britain, 316 long tons; Germany, 201; Holland, 617; Austria, 190; Italy, 205; France, 60; Belgium, 251; Panama, 75; total, 1,915 tons. Imports were 796 tons copper from Mexico.

Imports and exports of copper in Germany in January are reported as follows, in metric tons:

	1902.	1903.	Changes.
Imports	4,182	6,575	I. 2,393
Exports	346	411	I. 65
Balance, imports	3,836	6,164	I. 2,328

Imports of copper ores were 481 tons, against 258 tons in 1902; exports were 850 tons, against 1,017 tons last year.

Chilean Copper Market.—Messrs. Jackson Brothers report from Valparaiso, Chile, under date of February 7, that the market has been strong, with sales of 27,628 quintals bar copper, at an average of $33.75, Chilean, per quintal. Sales of matte have been 700 tons at an average of $14.55 per quintal, on a basis of 50 per cent copper. No sales of ores are reported, and no ores have been offered in the market.

Tin.—The upward movement, which was engineered about the middle of last week, was not of long duration, and the market has settled back into dullness. Consumers have not bought very freely, and have covered only their immediate requirements. At the close we quote spot and futures at 30@30⅛c.

The foreign market on Friday closed at £138 15s., and on Monday opened at £136 5s., and the closing quotations on Wednesday are cabled as £136@£136 5s. for spot and £136 10s.@£136 15s. for three months prompt.

Lead.—The feature of the week was a further advance in the price asked by the American Smelting and Refining Company, amounting to $6 per ton. It is understood that while the ore producers received the full advantage of the former advance of $5 per ton, they received only one-half of the present advance of $6. The closing quotations are 4.60@4.65c., New York, and 4.52½@4.57½c., St. Louis.

The foreign market remains firm, Spanish lead being quoted £13 11s. 3d.@£13 13s. 9d., with English lead 2s. 6d. higher.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 28, that the price of silver for the week has been 11.75 reales per ounce. Exchange has gone up by 20 centimos, making it 33.75 pesetas to £1. The local quotation for pig lead on wharf has been 65 reales per quintal, which is equal, on above exchange, to £10 15s. 8d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports include 553,505 kgs. pig lead and 366 kgs. silver bars to Marseilles.

Spelter continues very strong and advancing. There has been a good demand, especially on the part of galvanizers. At the close we quote St. Louis, 5.25c., and New York, 5.40@5.42½c.

The foreign market has also gone up, good ordinaries being quoted £23 10s.@£24, and specials, £23 15s.@ £24 5s.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 28, that ore is in good demand, and prices firm. Shipments for the week were 2,100 tons blende to Antwerp.

Silesian Spelter Market.—Herr Paul Speier reports from Breslau, Silesia, under date of February 27, that the market has been generally good. Current quotations for spelter were 20.75@21.10 marks per 50 kgs., f. o. b. cars, Breslau. The average is equivalent to 4.5c. per lb., New York. The demand for export has been good. The exports and imports in Germany for the month of January were, in metric tons:

	—Exports.— 1902.	1903.	—Imports.— 1902.	1903.
Spelter	5,313	5,916	1,841	1,251
Zinc sheets	1,243	1,342	10	2
Scrap zinc	245	341	89	156
Zinc white, etc.	1,366	1,017	172	200
Lithophone	662	709	6	1
Zinc ores	6,178	2,814	3,310	4,678

Zinc dust is included under the head of zinc white in these returns.

Antimony is dull and neglected. The ruling quotations are: Cookson's, 8¼c.; Hallett's, 6⅞@7c.; Hungarian, Japanese, French, U. S. Star and Italian, 6½@6⅝c.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quality, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Quicksilver.—The New York price is $47 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is somewhat lower, $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. 6d. per flask, with the same quotation from second hands.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum.	Per lb.		Per lb.
No. 1, 99% ingots	.33@37c.	Ferro-Tungsten (87%)	.28c.
No. 2, 90% ingots	.31@34c.	Magnesium	$2.75
Rolled Sheets	4c. up	Manganese, pure (N.Y.)	.60c.
Alum-bronze	.20@23c.	Mangan'e Cop. (20% Mn)	.32c.
Nickel-alum	.33@39c.	Mangan'e Cop. (30% Mn)	.38c.
Bismuth	2.10	Molybdenum (Best)	$1.82
Chromium, pure (N.Y.)	.80c.	Phosphorus	.45c.
Copper, red oxide	.50c.	American	.70c.
Ferro-Molyb'um (50%)	$1.25	Sodium metal	.50c.
Ferro-Titanium (10%)	.90c.	Tungsten (Best)	.62c.
Ferro-Titanium (20@25%, N. Y.)	.55c.		

Missouri Zinc Ore Market. March 14.
(From Our Special Correspondent.)

Lead ore advanced $7.50 per ton during the past week, an increase without precedent in one week, the selling price being $58.50 per ton delivered. The change, which cannot be attributed to the metal market, seems to be a local fight between the smelters of this district. The price has been carried so high that by the old methods of figuring 70 per cent saving from the ore, there would be only $1.55 per ton smelting charges after paying current prices. Zinc made another advance, the highest paid being $40.50 per ton for one lot of 64 per cent zinc. The assay basis price has been advanced $5 per ton in two weeks. A year ago lead sold at $43.50 per ton, and zinc at $32 per ton; a gain of $15 per ton for lead and $8.50 per ton for zinc.

Higher zinc prices come from several causes, chief of which is that the output of the mines has been curtailed through enforced idleness resulting from a lack of fuel, supplemented by rain, which was almost continuous throughout February, and lasted until Tuesday morning of this week. To mines remote from the railroad the question of a fuel supply became a serious matter the past three weeks, after the roads became so bad that it was almost impossible to haul in fuel and utterly impossible to haul out ore. The 8,000 tons in the bins, though 60 per cent of it is purchased, has been held back from the market by gravel roads cutting out in marshy places; and along the line of the Frisco Railroad from lack of cars for transporting the ore.

Following are the shipments from the various camps of the Joplin District for the week ending March 14, 1903:

	Zinc, lbs.	Lead, lbs.	Value.
Joplin	2,649,640	301,970	$53,877
Webb City-Carterville	1,623,840	444,980	39,698
Duenweg	1,233,330	144,270	25,151
Galena-Empire	871,870	103,700	17,419
Aurora	638,940	6,040	10,223
Zincite	404,410	.....	7,279
Carl Junction	327,790	.....	5,900
Granby	327,800	18,800	5,445
Prosperity	195,060	45,900	4,842
Carthage	272,040	.....	5,033
Reeds	186,380	.....	3,168
Central City	152,950	16,500	2,926
Mitchell	151,070	9,900	2,855
Oronogo	80,170	10,220	1,723
Spurgeon	82,140	19,930	1,399
Badger	74,470	.....	1,266
Cave Spring	65,120	.....	1,205
District totals	9,337,020	1,122,210	$189,399
Total 11 weeks	95,707,430	11,166,370	$1,784,401

Zinc value, week, $166,797; eleven weeks, $1,502,557. Lead value, week, $32,512; eleven weeks, $291,844.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	....	26.32	....	4.075	....	4.28
April	....	27.77	....	4.075	....	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.36	....	4.075	....	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September ...	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November ...	....	25.68	....	4.075	....	5.18
December ...	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.: for February, 4.861c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	.....	11.882	.....	12.188	....	53.39
April	.....	11.618	.....	11.986	....	52.79
May	.....	11.856	.....	12.226	....	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.03
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	....	....	25.00	54.23	27.04	60.63
April	....	....	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
Acacia, Colo.	April 1	.01	14,339	14,339
§Am. Agric. Chem., pf.	April 1	3.00	544,050	4,126,740
†Am. I. & Steel, pf.	April 1	.62½	37,500	525,000
†Am. Sm. & Ref., pf.	April 7	1.75	875,000	10,641,553
*Bartolome Mill, Mex.	Mar. 31	.77	1,540	68,103
Cambria Iron, Pa.	April 1	1.00	169,374	....
*Cinco Senores, Mex	Mar. 31	3.82½	7,650	679,035
†Dominion Coal	April 1	2.00	60,000	2,280,000
Dominion I. & St., pf.	April 1	3.50	175,000	700,000
*Homestake, So. Dak.	Mar. 25	.25	54,600	11,875,950
Met. Co., of Torrean. Mex.	April 1	7.50	187,500	187,500
†New Idria Quicks, Cal.	April 1	.30	30,000	460,000
Peerless Oil, Cal.	April 1	.12	10,400	86,120
†Republic I. & St., pf.	April 1	1.75	356,246	5,531,489
Sorpressa, Mex.	Mar. 20	1.91	1,836	187,489
†Sloss-Sheffield S. & I. pf.	Apr. 1	1.75	114,000	1,482,000
South Swansea, Utah	Mar. 12	.06	9,000	176,500
*Trinity County Gold, Cal	April 1	.05	5,000	20,000
†Va.-Car. Chem., pf.	April 15	2.00	240,000	6,540,000
Wolverine, Mich.	April 1	2.50	150,000	1,050,000

* Monthly. † Quarterly. § Semi-annual.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
American	Utah	2	Mar. 6	Mar. 25	.01
Bald Eagle Oil	Cal.	..	Mar. 23	.....	.03
Best & Belcher	Nev.	..	Apr. 10	Apr. 30	.15
Burton	Utah	1	Mar. 18	Apr. 3	.001
Brunswick Con.	Cal.	..	Apr. 6	.....	.03
Columbus Con.	Cal.	..	Mar. 30	.....	.01½
Con. New York	Nev.	17	Apr. 7	Apr. 28	.05
Justice	Nev.	..	Mar. 6	Mar. 27	.10
Laurel	Cal.	..	Apr. 2	.....	.03
Little Chief	Utah	15	Mar. 10	Mar. 28	.01
Marina Marsicana	Cal.	34	Mar. 9	Mar. 30	.02
May Day	Utah	1	Mar. 7	Mar. 25	.01½
Occidental	Nev.	41	Mar. 24	Apr. 14	.05
Old Colony & Eureka	Utah	4	Mar. 8	Mar. 27	.00¾
Overman	Nev.	12	April 7	April 28	.10
Sampson	Utah	..	April 2	.....	.01
Savage	Nev.	109	Mar. 5	Mar. 26	.10
Shasta County S. & R.	Cal.	..	Mar. 30	.....	.10
South Sliger	Cal.	..	Mar. 30	.....	.03
Tonopah & Salt Lake	Nev.	1	Mar. 28	Apr. 17	.10
Union Con.	Nev.	66	Mar. 10	Mar. 30	.10
Vulcan Sm. & Ref.	Cal.	..	Apr. 6	.....	.10
West Century	Utah	..	Mar. 7	Mar. 31	.01
Ybarra	L. Cal.	..	Apr. 3	.....	.10

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Mar. 11. H.	Mar. 11. L.	Mar. 12. H.	Mar. 12. L.	Mar. 13. H.	Mar. 13. L.	Mar. 14. H.	Mar. 14. L.	Mar. 16. H.	Mar. 16. L.	Mar. 17. H.	Mar. 17. L.	Sales
Alice, Mont.	$25	.43				.38								700
Amalgamated c., Mont	100	74¼	73½	75⅝	74¼	74⅝	73¼	73⅛	72¾	73⅛	71⅞	73⅝	72¾	337535
†Anaconda c., Mont.	25	121½	120	125	124	123½	110	120	118⅝	118¾	117⅛	122⅜	121	17,700
Anaconda Gold, Colo.	6	....	....	....	....	.15	....	....	....	....	....	....	....	1,000
Belcher, Nev.	3	....	....	.02	....	....	....	....	....	....	....	.06	....	600
Best & Belcher, Nev.	3	....	....	2.40	2.30	....	....	....	....	....	....	....	....	400
Brunswick, Cal.	1	.02	....	....	....	.02	....	....	....	.02	....	.02	....	12,200
Caledonia, Nev.	2½	....	....	2.60	....	2.75	....	....	....	2.90	....	2.65	....	800
Chollar, Nev.	3	....	....	....	....	.41	....	....	....	.45	....	....	....	300
C. K. & N., Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	1,000
Comstock T., s., Nev.	2	.11	.10	12½	.12	11⅛	.11	....	....	.12	....	.14	.12	22,200
Comst T. Bonds	100	....	....	12½	.10½	.11	.10	....	....	.11	.10	.12	.10½	15,000
Con. Cal. & Va., g. s. Nev	2½	2.15	....	2.05	....	....	....	....	....	2.15	....	2.10	....	1,100
Cons. Imperial, Colo.	1	....	....	.06	....	....	....	....	....	....	....	....	....	1,500
Cripple Creek c., Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Crown Point, Nev.	3	....	....	.45	....	....	....	....	....	....	....	.46	....	3,300
Daly, Utah	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Colo.	1	....	....	.10	....	....	....	....	....	....	....	....	....	500
Elkton g., Colo.	1	....	....	.08	....	....	....	....	....	....	....	.37	....	700
El Paso, Colo.	1	....	....	....	....	.55	....	....	....	....	....	....	....	600
Gold Dollar, Colo.	1	....	....	....	....	.05	....	....	....	....	....	....	....	200
Gould & Curry, Nev.	3	....	....	....	....	.43	....	....	....	.42	....	.49	....	700
Greene Con., c., Mex.	10	27½	26⅛	27½	26¾	27⅛	26½	26⅝	26⅜	26⅛	25⅜	25⅞	25¼	20,200
Hale & Norcross	3	1.00	....	....	....	....	....	....	....	....	....	....	....	400
Homestake, S. Dak.	100	65.00	....	....	....	....	....	....	....	....	....	....	....	20
Isabella, g., Colo.	1	....	....	....	....	.22	....	....	....	....	....	....	....	1,000
Jack Pot, Colo	1	.12	....	....	....	....	....	....	....	....	....	....	....	400
Leadville, Colo.	10	....	....	.03	....	....	....	....	....	....	....	....	....	1,000
Moon Anchor, Colo.	5	....	....	.08	....	....	....	....	....	....	....	....	....	200
Ontario, Utah	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Ophir, s., Nev	1	2.25	....	....	....	....	....	....	....	....	....	2.15	....	400
Pharmacist, Colo.	1	.04	....	....	....	....	....	....	....	....	....	....	....	1,000
Phœnix, Ariz.	1	.06	....	....	....	....	....	....	....	....	....	.06	....	700
Portland, Colo.	10	....	....	1.35	....	....	....	....	....	1.40	1.25	....	....	400
Potosi, Nev.	3	....	....	.40	....	....	....	....	....	....	....	.48	.46	1,000
Quicksilver, pfd.	100	....	....	....	....	....	....	75½	....	....	....	....	....	100
Savage, Nev.	2½	....	....	....	....	.37	....	....	....	....	....	....	....	100
Sierra Nevada, Nev	3	1.60	....	....	....	....	....	....	....	1.10	....	1.10	....	1,000
Silver Hill, Nev	1	....	....	....	....	.60	....	....	....	....	....	....	....	100
Small Hopes, Colo.	20	.42	....	....	....	....	....	....	....	....	....	....	....	100
Standard, Cal.	10	....	....	3.00	....	....	....	....	....	....	....	....	....	50
Tenn. c., Tenn	25	32½	32	34	32	34¼	33⅛	34	....	33½	....	....	....	12,450
Union Con., Nev.	2½	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Cop., N. C.	10	2¼	2⅜	2⅜	2¼	2⅜	2⅜	2⅜	....	....	....	2⅜	....	4,750
White Knob. g. s., Ida	100	10⅛	..	11¼	11	....	....	....	....	....	....	....	....	27

†Per Cent. Total sales 463,680 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Mar. 11. H.	Mar. 11. L.	Mar. 12. H.	Mar. 12. L.	Mar. 13. H.	Mar. 13. L.	Mar. 14. H.	Mar. 14. L.	Mar. 16. H	Mar. 16. L.	Mar. 17. H.	Mar. 17. L.	Sales
Adventure Con., c.	$25	100,000	12¾	12½	12¾	12½	12¾	12⅜	12¼	12	12½	12	12	....	1,176
Allouez	25	80,000	5⅞	5⅝	6¼	5⅞	6⅛	6	6⅛	6	7	6¼	7½	6⅜	8,507
Amalgamated, c.	100	1,558,879	....	....	75⅝	74⅜	74¾	73⅝	73⅝	73	73⅜	71¾	73½	72½	42,136
Am. Z. L. & Sm.	25	60,000	....	....	....	....	10½	10	....	....	12	11	12	11¾	4,079
Anaconda, c.	25	1,200 000	30	29½	30½	....	....	....	30	....	....	....	....	....	228
Arcadian, c.	25	150,000	4⅝	....	5⅝	5	5¼	4¾	5⅛	5	5¼	5⅛	5	4⅝	3,194
Arnold	25	60,000	.75	....	....	....	.80	....	.75	....	....	....	.90	....	570
Atlantic, c.	25	100,000	13¾	13	13⅝	13¼	14	13¾	14	13¾	13¾	13¾	13¾	13¾	2,690
Bingham Con., g. s.	50	150,000	35⅛	34½	35⅝	35	36⅜	35¾	35⅝	35¼	35⅜	34¾	34¾	34¼	3,882
Bonanza	10	300,000	....	....	....	....	....	....	....	....	....	....	....	....	50
British Columbia	25	250,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal. & Hecla, c.	25	100,000	530	525	551	535	551	547	550	545	545	540	545	540	532
Catalpa	10	300,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Centennial, c.	25	90,000	29¼	28¼	30⅜	29⅛	30	29¼	29¼	29	30	28⅛	29	28¼	11,610
Central Oil	25	60,050	....	....	....	....	....	....	....	....	....	....	....	....	....
Cochiti	10	182,250	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Mercur, g.	5	1,000,000	1⅝	1⅝	1⅝	1⅝	1 7/8	....	1⅝	....	1 15/16	....	1⅝	1 13/16	2,350
Copper Range Con.	100	285,000	70⅞	69¾	72⅜	70½	72½	71¼	71½	70	71¼	69	70¾	70	15,103
Daly-West., g. s.	20	180,000	39¼	38½	....	....	40	39	....	....	†40	39⅝	40	....	890
Dominion Coal, pf.	100	150,000	123½	122	124	122½	121	118¼	120	117	120	116	121½	120	4,506
Dominion Coal, pf.	100	30,000	....	....	....	....	....	....	....	....	117	116¼	117	....	68
Dominion I & S.	100	100,000	54⅜	52½	53	46	46	39	42⅜	41⅜	36	30½	37½	36	35,365
Elm River	12	100,000	....	....	3½	....	....	....	3½	3¼	3⅜	3⅜	5	3⅞	5,385
Franklin, c.	25	100,000	12	11⅜	12½	12	12½	12	....	....	12⅜	....	12⅝	....	620
Guanajuato, Con.	5	385,000	2⅜	2¼	2¾	2	....	....	2⅜	....	2	....	2	....	2,430
Isle Royale Con., c.	25	385,000	14⅝	14	15	14	14	13⅜	14	13	13⅝	13	14	13	1,375
Mass Con., c.	25	100,000	11⅞	11½	12	11½	11⅞	11¼	11⅜	11⅛	11¼	11	11	10⅜	2,240
Mayflower, c.	25	100,000	....	....	2½	2	....	....	....	....	....	....	1¾	....	20
Michigan, c.	25	100,000	10¼	10	10⅜	10	....	....	10½	....	10¼	....	10	....	585
Mohawk, c.	25	100,000	56	55	56½	55¾	....	....	56	....	55¾	....	55	54⅜	2,561
Mont. Coal & Coke	25	200,000	7	6	....	....	8	7	8	....	....	....	....	....	2,909
Mont'l & Boston, c.	5	570,000	1⅜	1⅛	....	....	1 1/8	1⅛	1 1/8	1⅛	1⅛	....	1⅜	....	1,760
New Idria, g.	5	100,000	9	....	....	....	....	....	....	....	....	....	....	....	100
Old Colony, c.	25	100,000	....	....	1⅜	....	2	....	....	....	....	....	....	....	150
Old Dominion, c.	25	150,000	21	20	22	21½	22	21½	22	21½	21	....	21	....	785
Osceola, c.	25	96,150	73⅛	71½	76⅜	75½	77	75	75¼	73	73⅜	70	73	70	4,563
Parrot, s. c.	10	229,850	30½	29½	33	30½	33⅜	32¾	33	32½	32⅜	32	32	....	3,071
Phœnix Con., c.	25	100,000	....	....	6¼	6	....	....	....	....	....	....	6¾	....	275
Quincy, c.	25	100,000	119	....	....	....	120	....	120	....	120	....	121	120	128
Rhode Island, c.	25	100,000	3¼	....	3¼	3	3¼	3	3¼	....	3	....	3¼	....	325
Santa Fe, g. c.	10	250,000	2⅝	....	2¾	2½	2⅝	2⅝	2⅝	2⅝	2⅝	2½	....	....	1,705
Shannon, c.	25	186,296	12¾	12	13⅜	12⅝	13⅜	12⅝	13⅝	13	13⅜	13	13⅝	13¼	11,445
Tamarack, c.	25	60,000	186	....	189	186	188	186	185	....	180	....	....	....	277
Tecumseh	25	90,000	....	....	1¼	....	1¾	....	....	....	1¼	....	....	....	30
Tennessee	25	175,000	....	....	33⅝	32	33	....	....	....	....	....	....	....	810
Trimountain	25	100,000	98¼	97½	100⅜	98¼	100	99¼	99½	98¼	99	98¼	98	....	1,899
Trinity, c.	25	160,000	11⅜	11¼	12	11⅜	12	11¼	11⅞	11¼	12	11¼	11½	11¼	2,315
United States, g.	25	419,000	....	....	26¼	25	26⅞	26	....	....	....	....	....	....	11,208
U. S. Coal & Oil	25	240,000	15¼	15	15⅝	15⅛	16⅛	15⅞	16⅛	15¾	17	16	16⅜	15⅞	23,561
Utah Con., g.	5	300,000	30¾	29	31	30	30⅜	30¼	30½	29⅜	30	29⅜	29⅜	29	16,470
Victoria, c.	25	100,000	7⅝	7⅝	8	7⅝	7⅝	7⅝	8	....	7⅛	7⅜	7⅝	7⅝	1,560
Washington	25	60,000	....	....	....	....	....	....	....	....	....	....	.50	.35	350
Winona, c.	25	100,000	8¼	8	10⅛	9¼	12⅜	10¼	14¼	12⅛	14 3/8	13	‡13¾	13	39,220
Wolverine, c.	25	62,000	75⅜	75⅛	77	75	77	76	73⅝	73⅛	‡74⅜	72⅝	72½	....	1,070
*Wolverine, pf.	..	....	....	....	....	....	74½	73⅜	....	....	....	....	....	....	60
Wyandot	25	100,000	1⅜	....	....	....	1⅜	1¼	1⅞	....	2⅜	2	2⅛	2⅛	16,960

* Boston Stock Exchange. † Ex Dividend. ‡ Assessment Paid. Total sales, 255,676 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Mar. 11. H.	Mar. 11. L.	Mar. 12. H.	Mar. 12. L.	Mar. 13. H.	Mar. 13. L.	Mar. 15. H.	Mar. 15. L.	Mar. 16. H.	Mar. 16. L.	Mar. 1. H.	Mar. 1. L.	Sal
Allis-Chalmers, U. S.	100	....	....	....	....	....	....	19	....	....	....	19	....	....
Allis-Chalm's, pf, U.S.	100	86¼	....	....	....	....	....	....	....	....	....	....	....	200
Am. Agr. Chem., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	60
Am. Agr. Chem. pf, U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref., U.S.	100	48½	47¾	49	48¼	49¼	48	49¼	49	51	49¼	51¾	50	32,400
Am. Sm. & Ref. pf, U.S.	100	95⅞	95	95⅞	95⅜	95⅜	95	96¾	96¼	96	95⅝	96¼	96	6,750
Am. steel & Fdy., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. S. & Fdy. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Col. Fuel & I., Colo.	100	66	65	65½	63¼	64¾	63½	65	64⅞	64¾	63¼	65¼	64½	3,600
Col. & H. C. & I., Colo.	100	19¾	....	19¾	....	20⅛	20	....	....	20¼	20	20¼	19⅞	1,410
†Crucible Steel, U. S.	100	20½	19⅜	20¼	20	20½	19¾	20⅜	20⅛	20¾	20¼	20	19⅝	5,506
†Crucible Steel, pf, U S	100	86	....	86	85¼	86	85⅞	86	85⅝	85¾	85½	85¾	85⅜	1,481
†Mong. R. Coal, Pa.	100	11½	11⅜	11⅝	11⅜	....	....	11⅜	....	12	11⅜	11⅜	....	1,895
†Mong. R. Coal pf, Pa	100	40	....	40	39¾	39⅞	....	40	....	40	....	40¾	40	840
National Lead, U.S.	100	25½	25	25	....	....	....	26	25⅜	26	....	....	....	800
National Lead pf, U.S.	100	....	....	....	....	89⅜	....	....	....	....	....	....	....	40
†Phila Nat. Gas	100	....	....	....	....	....	....	45	....	46⅜	45	48	46¾	5,435
†Phila Nat. Gas, pf	100	....	....	....	....	47¼	47⅛	....	....	....	....	....	....	205
†Pittsburg Coal, Pa.	100	28	27⅝	28	....	28⅛	....	....	....	28¾	....	29⅜	29	5,000
†Pittsburg Coal pf, Pa	100	90	....	90¼	90	90	89¾	90	....	90	....	90¼	90	2,038
Republic I. & S., U.S.	100	20½	19⅝	20¾	20¼	20½	19⅝	20½	....	20⅜	20	20	....	5,700
Republic I. & S., pf, U.S.	100	78⅜	....	79⅜	79⅜	79	....	79⅜	79½	78¾	78	77¼	....	1,610
Sloss-Shef S. & I., Ala.	100	....	....	66¾	65	65½	65	64	63	63	61	62½	59½	5,150
Sloss-Shef S. & I. pf, Ala.	100	....	....	....	....	....	....	....	....	....	....	96	....	100
Standard Oil, U.S.	100	675	670	670	665	670	667	680	665	670	665	....	....	157
Tenn. C. I. & R. R., Ala.	100	62⅜	61⅜	63¼	62⅛	64	62⅜	63⅜	63⅛	64¼	63¾	65½	64¼	12,575
U. S. Red & Ref., U. S.	100	....	....	....	....	32	31	....	....	....	....	....	....	200
U. S. Red & R. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S. Steel Corp., U.S.	100	37	36¼	37⅛	36⅞	37⅛	37¼	37⅜	37⅝	236⅜	36¼	36⅜	36⅛	58,650
U.S. Steel Corp. pf, U.S.	100	86¼	8.⅜	86¼	86	86¼	86	86⅜	86¼	86¼	....	86½	85⅞	34,122
U. S. Steel pf. rights.	....	....	....	....	....	....	....	....	....	86½	§86⅜	§86¾	....	11,912
Va.-Car Chem., U.S.	100	62⅜	....	62¼	61¾	63	62¾	63⅜	63	‡3¼	63	63¼	62¾	3,625
Va.-Car Chem. pf, U.S.	100	126	125	....	....	126¾	126	....	....	126¾	125	....	....	600
Va. I. C. & Coke, U. S.	100	....	....	....	....	37¼	36¾	....	....	....	....	....	....	210

* New York Stock Exchange. † Pittsburg Stock Exchange. ‡ Ex-dividend. § Ex-rights.
Total sales, 662,141 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Mar. 9. H.	Mar. 9. L.	Mar. 10. H.	Mar. 10. L.	Mar. 11. H.	Mar. 11. L.	Mar. 12. H.	Mar. 12. L.	Mar. 13. H.	Mar. 13. L.	Mar. 14. H.	Mar. 14. L.	Sales
Acacia	$1	.09¼	.09	.09⅛	.09¼	.09⅛	.09¼	.10	.09¼	.09⅜	.09⅝	.09⅛	....	8,000
Am. Con.	1	.02⅜	.01⅜	....	.01⅛	.01⅜	.01⅜	.02	.01⅜	.02¼	.02	.02¼	.02	500
Anaconda	1	.18	.13½	.18	.13½	.18	.13½	17	.13½	.17	.13½	17	.13½	....
Ben Hur	1	....	.02½	.02	.02½	.02	....	....	.02	....	.02	....	.02	2,000
Blue Bell	1	.08	....	.08	....	.08	....	.07¼	.05	.08	.04	.07	.05	....
C. C. & M.	1	.02⅛	.02	.02⅛	.02	.02⅛	.02	.02⅛	.02	.02¼	.02	.02⅛	.02	....
C. K. & N.	1	.15¼	.13	.13⅜	....	.13⅜	.12	.13⅜	.13½	.13	.12⅝	.13⅜	.13	25,500
C. C. Con.	1	.05¼	.04⅞	.05¾	....	.06¼	.05	.05⅜	.05	....	.04¾	.06⅜	.05	1,000
Coriolanus	1	.04	....	.04	....	.04	....	....	.04	....	.04	....	.04	....
Des Moines	1	.03⅜	.02	.03⅜	.03⅛	.03	.02⅞	.03	.02⅛	.03	.02¼	.03	.02	1,000
Dr. Jack Pot	1	.10	.09⅜	.10	.09⅝	.10	.09⅜	.10	.09⅜	.10	.09⅞	.10	.09⅞	1,000
Elkton Con.	1	.37¼	.36	.36¾	.36	.38	.37	.38¼	.37¾	.38	.37	.37¼	.37	10,800
El Paso	1	.57¾	.56¾	.56¾	....	....	....	.57	.56¼	.57¼	.57	.57½	.57	11,200
Fannie Rawlings	1	.05	.03½	.05	.04	.05	....	.05	....	.06	....	.05	....	....
Findley	1	.11¼	.11	.11⅜	.11⅜	.11⅜	.11¼	.11⅜	.11⅜	....	....	.12⅜	.12¼	16,000
Gold Dollar Con.	1	.05⅛	.05	.05¾	.05	.05¼	....	.05¼	.05¼	.06⅜	.06⅞	.05⅛	.05	30,000
Gold King	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Golden Cycle	1	.78	.74⅞	....	....	.78⅛	.75	.78⅜	.78	.75½	.74⅞	.78	.74	....
Golden Fleece	1	.11	.05	.11	.05	....	....	.05	....	.11	.05	....	.05	....
Gould	1	.04⅜	.04¼	.04¼	.04	.04¼	....	.19¾	.19¼	.04¼	.04¼	.04¾	.04¼	4,000
Hart	1	....	.02¼	....	.02¼	....	.02¼	....	.02¼	....	.02¼	....	.02	....
Isabella	1	.18⅞	.18⅝	.19¾	.19⅜	.19½	.19⅛	.19	.19	.19⅝	.18⅝	.19¾	.19½	21,000
Jack Pot	1	....	.10	....	.08½	....	.10	....	.10	....	.10	....	.10	....
Last Dollar	1	.65	.50	.21	.50	.20	.50	....	....	....	....	....	.50	....
Lexington	1	.04¼	.04¼	.04¼	....	.06	.04¾	.04¼	.04¼	.04¾	.04¼	.04¾	.04¼	3,000
Little Puck	1	.03¼	....	.03	.02¾	.02¾	.02⅝	.02¾	.02⅝	.03	.02⅝	.03	.02¾	2,000
Mollie Gibson	1	....	.06	.09	.06	....	....	....	.06¾	.07	.06⅛	....	.06⅜	....
Moon Anchor	1	.08¼	.07¾	.09	.08	.09	.07½	....	....	.09	.08	.08¼	.08	7,500
New Haven	1	.02⅜	.02¼	.02⅜	.02⅜	.02¼	.02	.02⅝	.02⅜	.02¼	.02¼	.02¼	.02⅝	17,000
Pharmacist	1	.04¾	.04¼	.04⅜	.04	.04¼	....	.04¾	.04¼	.04¾	.04¼	.04¼	.04¼	4,000
Pinnacle	1	....	.04¼	.04¼	.04¼	.05	.04¼	.04¾	.04¼	.04¾	.04¼	.05	.04¾	....
Pointer	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Portland	1	1.32	1.26	1.35	1.26	1.32	1.30	1.36	1.30	1.35	1.30	1.40	1.30	560
Prince Albert	1	.03¼	.02⅝	.03¼	.02¼	.03	.02¼	.03¼	....	.03	.02⅝	.03	.02⅛	....
Vindicator Con.	1	1.02	.90

STOCK QUOTATIONS.

MEXICO*. March 6.

Name of Company	Shares Issued.	Last div'd	Prices. Bid.	Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200		1,000	
Guananjuato.				
Angustias, Pozos	2,400	5.00	80	85
Cinco Senores y An., aviadoras	2,000	15.00	230	235
Cinco Senores y An., aviada	400	10.00		235
Providencia, San Juan de la Luz	6,000	2.00	180	190
Queensland y Australia	300		110	120
Guerrero.				
Garduno y Anexas	7,200		35	60
Hidalgo.				
Amistad y Concordia	9,800	5.30	71	72
Carmen, aviada	1,100		125	140
Guadalupe Fresnillo mill	1,000		250	300
Guadalupe Fresnillo Mine	1,400		70	80
La Blanca, aviadora	1,536			1,200
La Blanca, aviada	768			850
La Reina y An., aviadora	5,800			25
Maravillas y An., aviador	1,080		90	110
Maravillas el Lobo	1,000		150	180
Palma y An., aviador	1,800			12
Real del Monte	2,554	10.00	700	800
Santa Ana y An., aviadora	1,800		30	35
Santa Ana y An., aviada	600		25	30
Sta. Gertrudis y An., aviadas	9,600		7	8
Sta. Gertrudis y An., aviadora	28,800	1.00	80½	80
Santo Tomas Apostol aviadoras	5,100			3
San Felipe de Jesus, aviadora	3,600			40
San Felipe de Jesus, aviada	1,200			10
San Rafael y An., Trompillo	1,200	12.00	920	925
San Rafael y An., aviada	1,200	$8.00	$380	$400
Soledad, aviada	960	5.00	320	330
Sorpresa, aviada	960	5.00	285	300
Mexico.				
Alacran	2,400			40
Buen Despacho	3,000			70
Dos Estrellas	3,000	30.00	2,080	2,110
La Esperanza (El Oro)	3,000	10.00	1,190	1,200
La Reforma, aviadores	2,000		59	61
Santa Ana, Esperanza	2,400			96
Michoacan.				
Luz de Borda, aviadora	3,000		58	62
Luz de Borda, aviada	1,000		14	16
San Luis Potosi.				
Concepcion y An	3,000		70	80
El Barreno, aviadora	2,000	2.00	54	56
Sta. Maria de la Paz	2,400	10.00	730	740
San Diego y Annexas	2,400	4.00	25	
Zacatecas.				
Asturiana y An	2,500		45	
Candelaria y Pinos	2,500	10.00	300	310
Esperanza y An	2,400			40
Lourdes	2,500			
Luz de Minillas, pagadoras	2,000		20	30
San Carlos y Annexas	2,500	20.00		190
Sta. Maria de Gaud	2,500	10.00	125	135
Miscellaneous.				
Bartolome de Medina	2,000	1.50	75	80
Guadalupe Hacienda	10,000	3.00	250	260
La Luz Hac. (Pachuca)	3,750		300	305
La Reina (Chihuahua)	192			
Naica (Chihuahua)	100		6,000	
Natividad (Oaxaca) aviadora	1,800	6.00	550	650
Natividad (Oaxaca) aviadas	600	4.00	500	550
San Francisco Hac.	6,000	1.00	50	55
Santa Ana Huantla Morelos	4,000			
Union Hacienda	3,000	5.00	260	270

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	March. 16.	17.	Name of Company.	March. 16.	17.
Belcher	.66	.63	Justice	.18	.15
Best & Belcher	2.40	2.35	Mexican	1.45	1.45
Caledonia	2.60	2.40	Occidental Con	.45	.44
Challenge Con	.67	.62	Ophir	2.15	2.15
Chollar	.44	.42	Overman	.58	.55
Confidence	1.50	1.35	Potosi	.44	.42
Con. Cal. & Va	2.10	2.25	Savage	.38	.39
Con. Imperial	.05	.04	Sierra Nevada	1.00	.95
Crown Point	.46	.42	Union Con	1.20	1.15
Gould & Curry	.45	.41	Utah Con	.28	.27
Hale & Norcross	.90	.82	Yellow Jacket	.63	.59

SALT LAKE CITY.* Mar. 13.

Name of Company	Shares.	Par Val	High	Low	Sales.	Name of Company	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	.27½	.27½	1,000	M. Washington			.06½	.06	22,600
Ben Butler	500,000	1	.08½	.08	5,500	Mammoth	400,000	25	1.42	1.30	2,500
Bullion-Beck	100,000	10				May Day	400,000	.25	.17½	.13½	14,100
California	300,000	1	.09¼	.08	7,825	N. Y. Bonanza			.23¼	.22	26,100
Carisa	500,000	1	.14¾	.13	9,800	Ontario	150,000	100	6.50	6.50	225
Century	150,000	1	.73¾	.72	300	Sacramento	1,000,000	5	.28¾	.27	22,100
Con. Mercur	1,000,000	5	1.66	1.60	4,000	Star Con	500,000	1	.09½	.09½	500
Daly			3.15	2.72	1,900	S. Swansea	300,000	1	.21¾	.20¾	7,100
Daly-Judge	300,000	1	10.60	10.30	1,480	Sunshine	250,000	10			
Daly-West	180,000	20	39.65	38.50	1,563	Uncle Sam, Con	500,000	1	.25	.24¾	6,250
Grand Central	250,000	1	5.65	5.40	1,175	Victor	500,000	1	.27½	.25¾	5,900
L. Mammoth	150,000	1	.53¾	.56½	11,000	Wabash			.40	.30	38,700
La Reine			.06	05	3,900	Yankee Con	500,000	1	.42¾	.39	3,500

All mines are in Utah. *By our Special Correspondent. Total sales, 202,893 shares.

ST. LOUIS, MO.* Mar. 14.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Ask.	Name.	Capital Stock.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.30	$0.70	Columbia Lead, Mo.	$500,000	10	11.00	12.50
Catherine Lead, Mo.	500,000	10	1.50	3.00	Con. Coal, Ill	500,000	100		
Central Coal & C	1,875,000	100	67.00	68.00	Dee Run Lead Co	1,500,000	100	105.00	107.00
Central C. & C., pf.	1,875,000	100	77.00	79.00	Granite Bimet., Mt.	1,000,000	10	.85	.93
Central Lead, Mo	1,000,000	10	130.00	135.00	St. Joe Lead, Mo	6,000,000	10	15.75	17.00

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Mar. 11. H.	L.	Mar. 12. H.	L.	Mar. 13. H.	L.	Mar. 14. H.	L.	Mar. 16. H.	L.	Mar. 17. H.	L.	Sales
Am. Alkali, Mich	$50													
Am. Cement	10			8										50
Cambria Iron, Pa	50													
Cambria Steel, Pa	50	23¾	23⅝	24⅜	24	24¼	24	24⅛	24	24⅛	24⅛	25	24¼	3,339
Penn. Steel, pfd	100													
Susq. I. & S., Pa	5	2¼												
United Gas I., Pa	50	107¾	107	107⅜	107	107⅜	107	107¼	107	107¼	107	108	107⅜	4,451
Warwick I. & Steel	10					5⅛								450

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 9,085 shares.

LONDON. March 3.

Name and Country of Company	Shares Issued.	Par value. £.	s.	d.	Latest dividend. Amt. s.	d.	Date	Quotations. Buyers. £.	s.	d.	Sellers £.	s.	d.
Alaska-Treadwell, g., Alaska	200,000	5	0	0	1	6	Jan., 1903	4	12	6	4	15	0
Anaconda, c. s., Montana	1,200,000	5	0	0	2	0	Nov., 1902	6	1	3	6	3	9
Arizona, c., Def., ord	63,444	1	0	0	5	0	Feb., 1903	7	0	0	7	10	0
Arizona, pref., ord	316,530	1	0	0	5	6	Feb., 1903	7	7	6	7	12	6
Camp Bird, g., Colorado	738,000	1	0	0	0	7½	Mar., 1903	1	11	6	1	12	6
Copiapo, c., Chile	112,500	2	0	0	2	6	Feb., 1903	1	17	6	2	2	6
De Lamar, g. s., Idaho	80,000	1	0	0	2	0	Nov., 1902		10	0		12	6
Enterprise, g., British Col	165,000	1	0	0					2	6		7	6
El Oro, g., Mexico	980,000	1	0	0	1	6	Dec., 1902	1	10	0	1	12	6
Frontino & Bolivia, g., Colombia	128,962	1	0	0	3	0	July, 1901		18	9	1	1	3
Le Roi, g., British Col	200,000	5	0	0	5	0	Nov., 1899	1	7	6	1	10	0
Le Roi No. 2, g., British Col	120,000	6	0	0	5	0	May, 1902		18	9	1	1	3
Mesquital, Mexico	250,000		2	0		3	Feb., 1903		4	3		4	9
Montana, g. s., Montana	657,128	1	0	0		6	April, 1899		2	0		3	0
Mountain, c., Cal	250,000	5	0	0	4	0	Nov., 1902	3	2	6	3	7	6
Stratton's Independence, Colorado	1,000,007	1	0	0		6	April, 1902		8	3		8	9
St. John del Rey, g., Brazil	546,265	1	0	0		6	Dec., 1902		14	6		15	6
Utah Con., g. c., (Highland Boy), Utah	300,000	1	0	0	7	0	Jan., 1903	5	15	0	6	5	0
Ymir, g., British Col	200,000	1	0	0	1	0	Mar., 1902		11	3		13	9
European:													
Linares, l., Spain	15,000	3	0	0		9	Oct., 1902	3	5	0	3	15	0
Mason & Barry, c., sul., Port'g'l	185,172	1	0	0	13	0	May, 1902	3	17	6	4	2	6
Rio Tinto, c., Spain	325,000	5	0	0	22	6	Nov., 1902	49	10	0	49	15	0
Rio Tinto, pref., Spain	325,000	5	0	0	2	6	Nov., 1902	6	0	0	6	5	0
Tharsis, c., Spain	625,000	2	0	0	8	0	May, 1902	4	15	0	5	0	0
Australia and New Zealand:													
Assoc. Gold Mines, W. Australia	495,348	1	0	0	1	6	Jan., 1900	2	1	3	2	2	6
Briseis, Tin, Tasmania	600,000	1	0	0					9	0		10	0
Broken Hill Pr'p., s., N. S. Wales	960,000		8	0	1	0	Feb., 1903	1	12	6	1	15	0
Cosmopolitan Prop., W. Australia	385,000	1	0	0		6	July, 1902		16	6		17	0
Golden Horse Shoe, W. Australia	300,000	5	0	0	6	0	Nov., 1902	11	1	3	11	3	9
Great Fingall Con., W. Australia	250,000	1	0	0	5	0	Sept., 1902	7	11	3	7	13	9
Great Bo'd'r Pr'p., W. Australia	1,750,000		2	0		6	Mar., 1903	1	2	6	1	3	0
Ivanhoe Gold Corp. W. Australia	400,000	5	0	0	4	0	Jan., 1903	8	16	3	8	18	9
Kalgurli, g., W. Australia	120,000	1	0	0	2	6	Jan., 1903	4	7	6	4	10	0
Lake View Cons., g., W. Australia	250,000	1	0	0	rts.		Aug., 1902	2	17	6	3	0	0
Mt. Lyell M. & R. L., c., Tasmania	275,000	3	0	0	1	0	Jan., 1903	3	10	0	3	15	0
Mt. Morgan, g., Queensland	1,000,000	1	0	0		3	Mar., 1903	4	2	6	4	7	6
Waihi, g., New Zealand	497,412	1	0	0	2	6	Mar., 1903*	5	6	3	5	8	9
Indian:													
Champion Reef, g., Colar Fields	473,000		10	0	5	0	Jan., 1903	6	17	6	7	0	0
Mysore Gold, Colar Fields	530,000		10	0	5	0	Mar., 1903	7	3	9	7	6	3
Nundydroog, g., Colar Fields	484,000		10	0	1	6	Mar., 1903	2	3	9	2	6	3
Ooregum, g., Colar Fields	343,000		10	0	1	3	Dec., 1902	1	15	0	1	17	6
Ooregum, pref., g., Colar Fields	240,000		10	0	1	3	Dec., 1902	2	3	9	2	6	3
African:													
Angelo, g. Transvaal	600,000	1	0	0	6	0	Feb., 1903	7	5	0	7	10	0
Bonanza, Transvaal	200,000	1	0	0	12	0	Feb., 1903	5	13	9	5	16	3
British South Africa	4,439,019	1	0	0	rts.		May, 1899	3	5	0	3	7	6
Cape Copper, S. Africa	300,000	2	0	0	8	0	Jan., 1902	3	0	0	3	5	0
Cape Copper, pref., S. Africa	75,000	2	0	0	2	3	Jan., 1903	3	2	6	3	7	3
City and Sub'n (New), g., Transvaal	340,000	4	0	0	3	0	Aug., 1899	6	6	3	6	8	9
Crown Reef, g., Transvaal	120,000	1	0	0	15	0	Oct., 1902	17	5	0	17	15	0
De Beers Con., d., pref., Cape Colony	800,000	2	10	0			Jan., 1903	19	16	3	19	18	9
De Beers Con., def	1,000,000	2	10	0	12	6	Jan., 1903	21	15	0	21	17	6
East Rand, Prop, Transvaal	970,000	1	0	0	rts.		May, 1902	8	3	9	8	6	3
Ferreira g., Transvaal	90,000	1	0	0	20	0	Feb., 1903	22	15	0	23	5	0
Geldenhuis Est., g., Transvaal	200,000	1	0	0	5	0	Feb., 1903	6	16	3	6	18	9
Geduld, g., Transvaal	400,000	1	0	0	rts.		Mar., 1902	8	0	0	8	2	6
Henry Nourse, g., Transvaal	125,000	1	0	0	8	0	Feb., 1903	8	17	6	9	2	6
Jagersfontein, d., Orange F. S	200,000	5	0	0	6	0	Nov., 1899	26	12	6	26	17	6
Jubilee, g., Transvaal	50,000	1	0	0	bonus.		Aug., 1902	5	7	6	5	12	6
Jumpers, Transvaal	100,000	1	0	0	5	0	Aug., 1899	4	0	0	4	5	0
Langlaagte Est., g., Transvaal	470,000	1	0	0	3	0	Sept., 1899	4	6	3	4	8	9
May Con., g., Transvaal	288,750	1	0	0	3	0	Feb., 1903	4	10	0	4	12	6
Meyer & Charlton, g., Transvaal	100,000	1	0	0	3	0	Feb., 1903	5	12	6	5	15	0
Namaqua, c., Cape Colony	94,331	2	0	0	2	0	June, 1902	3	15	0	4	0	0
Primrose (New), g., Transvaal	325,000	1	0	0	2	0	Feb., 1903	3	18	9	4	1	3
Rand Mines, g., S. Africa	1,795,956		5	0	4	0	Aug., 1902	10	15	0	10	17	6
Robinson, g., Transvaal	750,000	5	0	0	6	0	Feb., 1903	10	15	0	11	0	0
Robinson Deep, g., Transvaal	450,000	1	0	0	5	0	May, 1899	5	1	3	5	3	9
Rose Deep, Transvaal	425,000	1	0	0	2	0	Feb. 1903	8	17	6	9	2	6
Salisbury, g., Transvaal	100,000	1	0	0	2	0	Mar., 1899	2	15	0	3	0	0
Sheba, g., Transvaal	1,075,000	1	0	0		6	July, 1898	1	5	0	1	6	3
Village Main Reef, Transvaal	400,000	1	0	0	5	0	Oct., 1902	8	12	6	8	17	6
Wemmer, Transvaal	80,000	1	0	0	10	0	Jan., 1903	12	10	0	13	0	0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Mar. 10. £.	s.	d.	Mar. 17. £.	s.	d.	Name of Company	Mar. 10. £.	s.	d.	Mar. 17. £.	s.	d.
Anaconda	6	10	0	6	10	0	Johannesburg Invest	3	5	0	3	7	6
British South Africa	3	3	9	3	6	3	Modderfontein	10	15	9	10	17	6
Camp Bird	†1	11	6	1	9	9	Rand Mines	10	16	3	11	0	0
Con. Gold-Fields	7	13	9	7	18	9	Rio Tinto com	52	7	6	52	10	0
De Beers Con. def	22	2	6	21	6	3	Simmer & Jack	1	15	0	1	15	7½
East Rand	8	2	6	8	5	0	Tomboy	1	16	3	1	17	6
Jagersfontein	26	10	0	26	5	0							

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York. †Ex-Dividend March 12.

PARIS. Feb. 25

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Closing Fr.
Boleo	Lower Cal	Copper		500	170.00	1,340.00	1,500.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	23.00	22.00
Fraser River	Brit. Col'mb.	Gold	250,000	25		6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	57.00	102.50
Metaux, Cie. Fran. de	France	Metal dealers	25,000,000	500	22.50	475.00	489.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	443.00	471.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25		1.00	0.75
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	634.00	644.00

TORONTO, ONT.* Mar. 14.

Name of Company.	par val	Prices. High.	Low.	Sales.	Name of Company	Par val	Prices. High.	Low.	Sales.
Black Tail	$1	.07¼	.04		Granby Smelter	$10	510	475	
Cariboo (Mc. K.)	1	.17	.10		Mountain Lion	1	.15	.10	
Cariboo (Hyd.)	1	.75			North Star	1	.13	.10¾	
Center Star	1	.33	28	2,000	Nova Scotia Steel, com	100	100	105	
Crows Nest. C.	100	350	300		Payne	1	.21	.19	2,500
Dominion Coal, com	100	125¼	117		Rambler Cariboo	1	.35	.26	
Dominion S. & I.	100	58¾	31¾		Republic	1	.07	.05	
Dominion S. & I., pref.	100				St. Eugene	1	.35	.28	
Fairview	1	.05¼	.04¾		Virtue	1	.09	.06	2,500
Giant	1	.03¾	.02		War Eagle Con	1	.17¾	.15	

*Standard Stock and Mining Exchange. Total sales 7,000 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—	Cust.Meas.	Price.
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont., car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h.' gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01¾@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg.	"	.07

ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06

ALCOHOL—Grain	gal.	2.43@2.45
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50

ALUM—Lump	100 lbs.	1.75
Ground	"	1.80
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00

ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50

AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½

AMMONIUM—		
Carbonate, lump	"	.07¼
Powdered	"	.08
Muriate	"	.05¾
Lump	"	.08¼
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12

ANTIMONY—Glass		.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16

ARSENIC—White powd.	"	.02¾@.03¼
Red	"	.06¾@.07

ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh.ton	35.00
San Valentino (Italian)	lg.ton	16.00
Seyssel (French), mastic	sh.ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾

BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@96%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100lbs.	1.67½@1.76
Chem. pure cryst	lb.	.06
Nitrate, powdered	"	.05½

BARIUM	Cust.Meas.	Price.
Sulphate (Blanc Fixe)	lb.	$0.02

BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
German, gray	"	14.50
Snow white	"	17.00

BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75

BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25

BITUMEN—"B"	"	.03½
"A"	"	.05

BONE ASH	"	.02¼@.02½

BORAX	"	.07¼@.07½

BROMINE—Bulk.	"	.35

CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50

CALCIUM—Acetate, gray	"	1.30
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90

CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.70@1.90
Foreign	"	1.65@2.25
"Rosendale," 300 lbs	"	.75
Slag cement, imported	"	1.65

CERESINE—		
Orange and Yellow	lb.	.12½
White	"	.13½

CHALK—Lump, bulk	sh.ton	3.00
Ppt. per quality	lb.	.03¾@.06

CHLORINE—Liquid	"	.30
Water	"	.10

CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00

CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.00
Am. best, ex-dock, N. Y.	"	9.00
English, common	"	12.00
Best grade	"	17.00
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00

COAL TAR PITCH	gal.	.08

COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.26@2.30
Gray	"	2.28@2.40
Smalt, blue ordinary	"	.06
Best	"	.20

COPPERAS—in bulk	100 lbs.	.42½
In bbls	"	.47½

COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19

CRYOLITE	"	.06½

EXPLOSIVES—		
Blasting powder, A.	25 lb. keg	.65
Blasting powder, B.	"	1.40
"Rackarock," A.	lb.	.25
"Rackarock" B.	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultra. (32-2-10° Be.)	"	.13⅞@.14

FELDSPAR—Ground	sh.ton	8.00@9.00

FLINT PEBBLES—Dan. Best	lg.ton	14.75
French, Best	"	11.75

FLUORSPAR—		
Am. lump. 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00

FULLER'S EARTH—Lump	.100 lbs.	.75
Powdered	"	.80

GRAPHITE—Am. f.o.b. Providence, R. I., lump	sh.ton	$8.00
Pulverized	"	30.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv.	"	.01m

GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00

INFUSORIAL EARTH—Gr'd.		
American best	"	20.00
French	"	37.50
German	"	40.00

IODINE—Crude	100 lbs.	2.45

IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03

KAOLIN—(See China Clay.)		

KRYOLITH—(See Cryolite.)		

LEAD—Acetate, white	"	.08¼@.08½
Brown	"	.06¼@.06½
Nitrate, com'l	"	.06½
" gran.	"	.08¼

LIME—Com., abt. 250 lbs.	bbl.	.80
Finishing	"	.90

MAGNESITE—Greece.		
Crude (95%)	lg.ton	6.00@6.50
Calcined	sh.ton	17.50@18.00
Bricks	M	170.00
Am. Bricks, f.o.b. Pittsburg	"	175.00

MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95

MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.30

MARBLE—Flour	sh.ton	6.00@7.00

MERCURY—Bichloride	lb.	.77

MICA—N. Y. gr'nd, coarse.	sh.ton	33.00@38.00
Fine	lb.	.00¾@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00

MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00

NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21

OILS—Black, reduced 29 gr.: 25@30, cold test	gal.	.11½@.12½
15, cold test	"	.12½@.12¾
Zero	"	.13½@.13¾
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.10¼@.11¾
Dark, filtered	"	.15½@.17½
Light, filtered	"	.16½@.19
Extra cold test	"	.27½@.31½
Gasoline, 86°@90°	"	.15@.20
Naphtha, crude, 68°@72°	bbl.	9.05
"Stove"	gal.	.12½
Linseed, domestic raw	"	.43@.46
Boiled	"	.48
Calcutta, raw	"	.75

OZOKERITE	lb.	.11½

PAINTS AND COLORS—		
Chrome green, common	"	.05
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.25
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05¼@.05½
English flake	"	.08¼@.08½
Glassmakers'	"	.07¾@.08½

PAINTS AND COLORS—	Cust.Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01½@.01¾
Orange mineral, Am.	"	.08@.08¼
Foreign, as to make	"	.08¼@.11¾
Paris green, pure, bulk	"	.12
Red lead, American	"	.06@.06¼
Foreign	"	.06¾@.08
Turpentine, spirits	gal.	.67¾@.68
White lead, Am., dry	lb.	.05¼@.05½
American, in oil	"	.06¼@.06¾
Foreign, in oil	"	.06¼@.06½
Zinc, white, Am., ex dry.	"	.04½@.04¾
American, red seal	"	.06½
Green seal	"	.07
Foreign, red seal, dry	"	.06@.06¼
Green seal, dry	"	.06¼@.06½

POTASH		
Caustic, ordinary	"	.04½@.04¾
Elect. (90%)	"	.06¼

POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08½@.09
Bromide, bulk	"	.22
Carbonate (80@85%)	"	.02¾@.03
Chlorate, f.o.b. works	"	.07@.07¼
Foreign, f.o.b. N. Y.	"	.07@.07¼
Chromate	"	.35
Cyanide (98@99%)	"	.20@.21
Kainit	lg.ton	9.30
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09¼@.10
Prussiate, yellow	"	.13¼@.13½
Red	"	.34
Sulphate, 90%	100lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41

QUARTZ—(See Silica).		

SALT—N. Y. com. fine 280 lbs	bbl.	.72@1.15
N. Y. agricultural	sh.ton	4.40

SALTPETRE—Crude	100 lbs.	3.50
Refined	"	4.25@4.62½

SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75

SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.31
Oxide	"	.85@1.10

SODIUM—		
Bicarb., ordinary, f.o.b. w'ks	100 lbs.	1.25
Foreign, f.o.b. N. Y.	"	1.50
Extra domes., f.o.b. w'ks	"	3.00
Bichromate	lb.	.06¾
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.75
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 60@78%, f.o.b. w'ks	"	1.65@1.70
Foreign, f.o.b. N. Y.	"	1.90@2.00
Chlorate, com'l	"	.07¼@.07¾
Hyposulphite, Am.	100 lbs.	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.20
Shipments	"	1.87½@2.00
Peroxide	lb.	.45
Phosphate	"	.02¼@.02¼
Prussiate	"	.09¾
Sal soda, f.o.b. works	100 lbs.	.55
Foreign, f.o.b. N. Y.	"	.67½
Silicate, conc.	"	.06
Com'l	"	.01
Sulphate, com'l	100 lb.	82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.02½

SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15

TALC—N. C., 1st grade	sh.ton	13.75
N. Y., Fibrous, best	"	10.20
French, best	100 lbs.	1.25
Italian, best	"	1.62½

TAR—Regular	bbl.	2.30
Oil barrels	"	4.80

TIN—Crystals	lb.	.22
Oxide	"	.45

URANIUM—Oxide		2.25@3.00

ZINC—Metallic, ch. pure	"	.07@.09¾
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¼@.04¾
Dust	"	.04¾@.04½
Sulphate	"	.03¾@.03¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50

CALCIUM—Tungstate (Scheelite)	"	.80

CERIUM—Nitrate	"	10.00

DIDYMIUM—Nitrate	"	35.00

ERBIUM—Nitrate	"	40.00

GLUCINUM—Nitrate	"	20.00

LANTHANUM—Nitrate	"	30.00

LITHIUM—Nitrate	oz.	.60

STRONTIUM—Nitrate	lb.	.07@.07¾

THORIUM—Nitrate 49@50%.	"	4.50

URANIUM—Nitrate	oz.	.25

YTTRIUM—Nitrate	lb.	40.00

ZIRCONIUM—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.